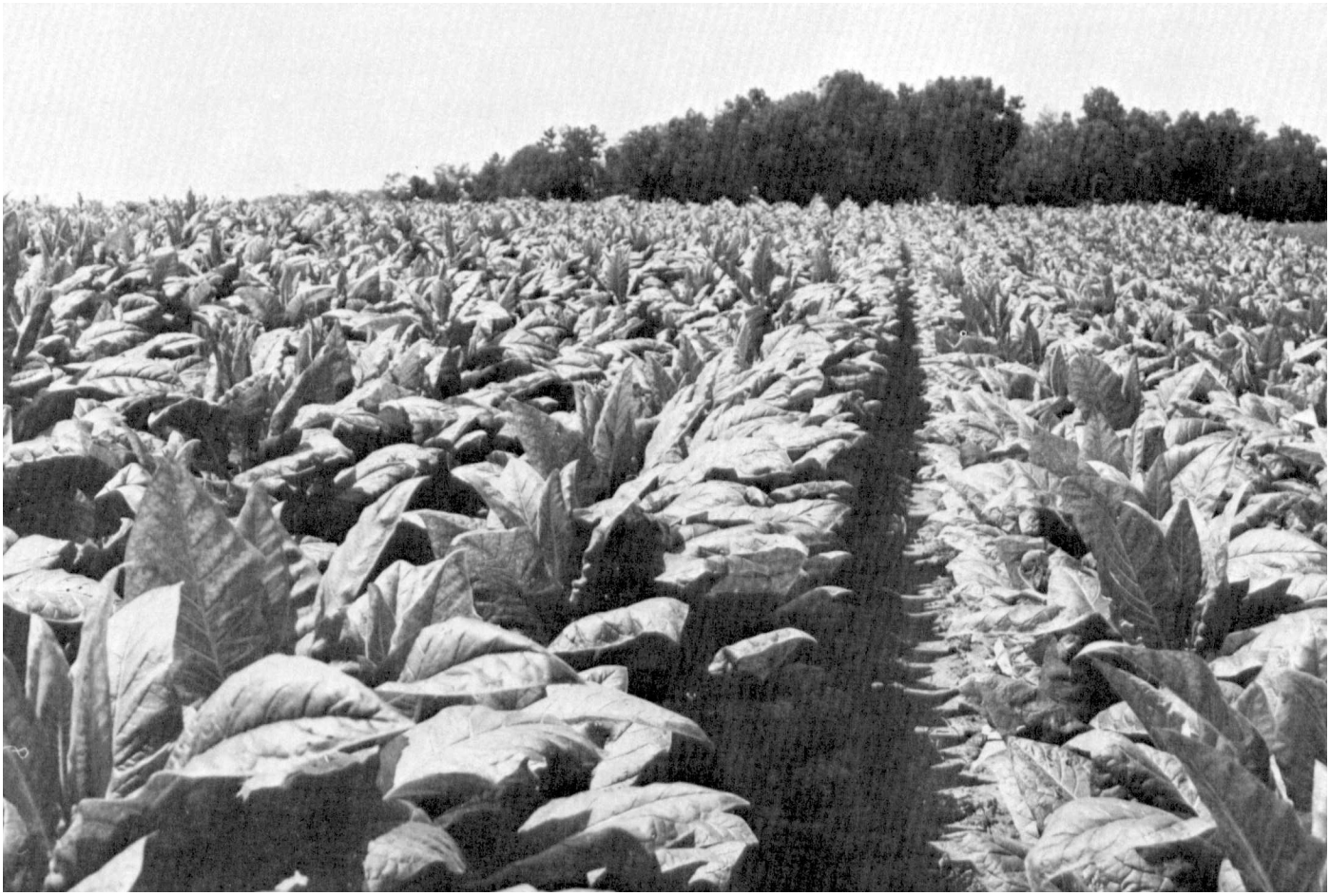
SOIL SURVEY OF

Laurel and Rockcastle Counties, Kentucky



United States Department of Agriculture
Soil Conservation Service and Forest Service
In cooperation with
Kentucky Agricultural Experiment Station

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1968–72. Soil names and descriptions were approved in 1973. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1973. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Laurel County Conservation District and to the Rockcastle County Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Laurel and Rockcastle Counties are shown on the detailed map at the back of this survey. The map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the woodland suitability group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be placed over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and the woodland suitability groups.

Foresters and others can refer to the section "Use of Soils for Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of Soils for Wildlife Habitat."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Community planners and others can read about soil properties that affect the choice of sites for dwellings and industrial buildings and for recreation areas in the section "Town and Country Planning."

Scientists and others can read about how the soils formed and how they are classified in the section "Formation, Morphology, and Classification of the Soils."

Newcomers in Laurel and Rockcastle Counties may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the introduction to the Survey.

Cover—Tobacco on Whitley silt loam.

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SOIL SURVEY OF LAUREL AND ROCKCASTLE COUNTIES, KENTUCKY

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UNITED STATES DEPARTMENT OF AGRICULTURE,
SOIL CONSERVATION SERVICE AND FOREST SERVICE,
IN COOPERATION WITH THE
KENTUCKY AGRICULTURAL EXPERIMENT STATION

LAUREL AND ROCKCASTLE COUNTIES are in the southeastern part of Kentucky (fig. 1). Laurel County has an area of 285,250 acres, and Rockcastle County has an area of 199,040 acres. The total combined land area of both counties is 484,290 acres, or about 756 square miles. The population of Laurel County was 27,386 in 1970, and that of Rockcastle County was 12,305 (U.S. Census, 1970). London is the county seat of Laurel County, and Mount Vernon is the county seat of Rockcastle County.

Almost all the soils in the survey areas are acid, and crops grown on them respond to application of lime and fertilizer. The soils in the northern and northwestern parts of Rockcastle County are on steep uplands and in relatively wide, undulating valleys. They formed in material derived from siltstone and shale. The soils in the southwestern part of Rockcastle County, from Roundstone to the Lincoln County and Pulaski County line, are gently sloping to moderately steep. They formed in material derived from limestone. In the eastern part of Rockcastle County and in all of Laurel County, the soils are steep and formed in material derived mostly from sandstone and shale.

The elevation in the survey area ranges from about 723 to 1,730 feet above sea level. The climate is temperate, and the growing season, defined as the number of days between the last temperature of 32° F in spring and the first in fall, averages about 181 days.

Farming is diversified in the survey area. In 1969 Laurel County had 1,706 farms with an average size of 69 acres. Rockcastle County had about 1,164 farms with an average size of 109 acres. Growing crops and raising livestock are the main farm enterprises.

According to the Conservation Needs Committee, Laurel County has about 141,000 acres of forest land, and Rockcastle County has about 129,000 acres. Of this total, the Forest Service owns and manages about 51,000 acres in Laurel County and about 11,000 acres in Rockcastle County.

[1] The soils were surveyed by JAMES C. ROSS, ALBERT S. JOHNSON, DAVID T. CARROLL, and THOMAS G. SPARKS of the Soil Conservation Service and PETER E. AVERS, GEORGE D. BOTTRELL, LEWIS G. MANHART, and JOHN K. LONG, JR. of the Forest Service.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Laurel and Rockcastle Counties, where they are located, and how they can be used. The soil scientists went into the counties knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil

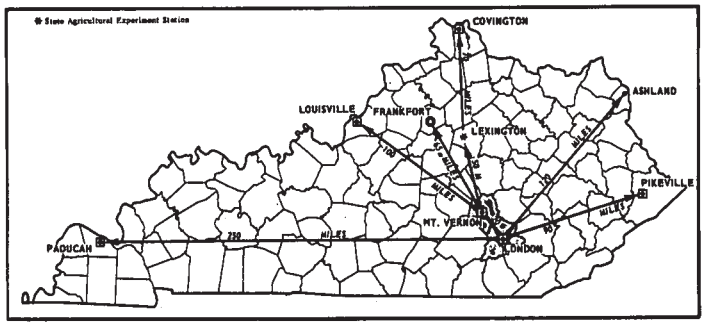

Figure 1.—Location of Laurel and Rockcastle Counties in Kentucky.

of that series was first observed and mapped. Frederick and Whitley, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Frederick silt loam, 2 to 6 percent slopes, is one of several phases within the Frederick series.

Some soils are like the soils in a given series except for at least one differentiating characteristic. If the acreage is small, the soils are called a variant of that series and are given the name of the series as modified by the differentiating feature. An example is Newark variant.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Laurel and Rockcastle Counties: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Shelocta-Rigley complex is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. If there are two or more dominant series represented in the group, the name of the group ordinarily consists of the names of the dominant soils, joined by "and." Lily and Steinsburg fine sandy loams is an example.

In most areas surveyed, there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Strip mines and Rock outcrops are land types in this survey area.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or its high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soil. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil maps at the back of this survey show, in color, the soil associations in Laurel and Rockcastle Counties. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

The soil associations of Laurel and Rockcastle Counties do not necessarily join those of Whitley, McCreary, Pulaski, and Madison Counties. It was necessary to rename soil series after the latter counties were surveyed. Also, some of the associations shown in these counties are of such minor extent in Laurel and Rockcastle Counties that they do not justify delineation on the general soil map.

A map showing soil associations is useful to people who want a general idea of the soils in the counties, who want to compare different parts of the counties, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the manage-

ment of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations of Laurel and Rockcastle Counties are described in the following paragraphs.

General Soil Map of Laurel County

1. Shelocta-Latham-Whitley association

Sloping to very steep, moderately deep and deep soils that have a clayey or loamy subsoil; on side slopes and ridgetops

The landscape of this association is made up of long, steep and very steep side slopes (fig. 2) and narrow, sloping and moderately steep ridgetops. The range in elevation from the ridgetops to the valley floor is about 200 to 300 feet. In most places this association lacks the sandstone cliffs of association 6.

This association makes up about 35 percent of Laurel County. Shelocta soils make up about 36 percent of this association; Latham soils, about 27 percent; Whitley soils, about 9 percent; and minor soils, the remaining 28 percent.

Shelocta soils are sloping to very steep soils mostly on lower side slopes. They are deep and well drained. The subsoil is silt loam or silty clay loam, and it is about 5 to 30 percent, by volume, coarse fragments.

Latham soils are sloping to very steep soils on ridgetops and side slopes. They are moderately well drained and moderately deep to soft shale. The subsoil is mostly silty clay or clay.

Whitley soils are sloping and moderately steep soils mostly on ridgetops. They are deep and well drained. The subsoil is silt loam or silty clay loam in the upper part and silty clay loam or silty clay in the lower part.

The minor soils in this association are Lily and Steinsburg soils on ridgetops and side slopes; Allegheny, Cotaco, and Morehead soils on toe slopes and terraces; and Bonnie, Cuba, Steff, and Stendal soils on flood plains. Several areas of Strip mines are in this association.

The average farm in this association is about 70 acres in size and is operated by the owner. Most of this association is used for general farming and woodland. About 55 percent of the acreage is in pasture and hay crops; about 35 percent is wooded; and about 10 percent is in row crops, mainly corn and tobacco.

The main limitations to use of the soils for row crops are the hazard of erosion on all the soils and the difficulty of using equipment on the steep and very steep Shelocta and Latham soils.

2. Stendal-Bonnie-Whitley association

Nearly level, deep, somewhat poorly drained and poorly drained soils that have a loamy subsoil, on bottom lands; and gently sloping and sloping, deep, well drained soils that have a loamy subsoil; on ridges

Figure 2.—Typical topography and land use in Shelocta-Latham-Whitley association.

The landscape of this association is nearly level on flood plains adjacent to the main streams (fig. 3), but it becomes gently sloping and sloping on ridges at various distances from the main streams. The range in elevation from the ridgetops to the flood plains is about 25 to 50 feet.

This association makes up about 4 percent of Laurel County. One part of this association is adjacent to Laurel River, and the other part is adjacent to Little Laurel River. Stendal soils make up about 39 percent of this association; Bonnie soils, about 16 percent; Whitley soils, about 8 percent; and minor soils, the remaining 37 percent.

Stendal soils are nearly level soils on flood plains. They are deep and somewhat poorly drained. The subsoil is silt loam.

Bonnie soils are nearly level soils on flood plains. They are deep and poorly drained. The subsoil is silt loam.

Whitley soils are gently sloping and sloping soils on ridges. They are deep and well drained. The subsoil is silt loam or silty clay loam in the upper part and silty clay loam or silty clay in the lower part.

The minor soils in this association are Latham soils on the higher ridges and Allegheny; Cotaco; Morehead; Bonnie, terrace; Stendal, terrace; and Whitley, terrace, soils on the terraces.

The average farm in this association is about 70 acres in size and is operated by the owner. Most of this association is used for general farming. About 50 percent of the acreage is in pasture and hay crops; about 10 percent is in row crops, mainly corn and tobacco; and about 40 percent is wooded.

The main limitations to use of the soils for row crops are wetness, the hazard of erosion, and the hazard of flooding on Stendal, Bonnie, and Whitley soils.

3. *Whitley-Latham-Lily association*

Gently sloping to steep, moderately deep and deep soils that have a loamy or clayey subsoil; on ridgetops and side slopes

The landscape of this association is a series of gently sloping to moderately steep ridges that, in places, descend steeply to narrow valleys or ascend to steep hills (fig. 4). The range in elevation from the ridgetops to the valley floor or to steep hilltops is about 100 feet.

This association makes up about 24 percent of Laurel County. Whitley soils make up about 39 percent of this association; Latham soils, about 18 percent; Lily soils, about 13 percent; and minor soils, the remaining 30 percent.

Whitley soils are gently sloping to moderately steep. They are deep and well drained. The subsoil is silt loam

Figure 3.—**Typical topography of bottom land in Stendal-Bonnie-Whitley association. The soil is Bonnie silt loam.**

Figure 4.—**Typical topography and land use in Whitley-Latham-Lily association. The soil in the foreground is Stendal silt loam, terrace. The soils in the background are in the Shelocta and Latham series.**

or silty clay loam in the upper part and silty clay loam or silty clay in the lower part.

Latham soils are mostly sloping to steep. They are moderately well drained and moderately deep to soft shale. The subsoil is mostly silty clay or clay.

Lily soils are mostly gently sloping to moderately steep. They are moderately deep and are well drained. The subsoil is mostly sandy clay loam or clay loam.

The minor soils in this association are Shelocta, Steinsburg, and Tilsit soils on ridgetops and side slopes; Allegheny, Cotaco, and Morehead soils on toe slopes and terraces; and Bonnie and Stendal soils on flood plains. Several areas of Strip mines are in this association.

The average farm in this association is about 70 acres in size and is operated by the owner. The Forest Service owns and manages about 5 percent of this association, almost all of which is wooded. The part that is privately owned is used for general farming. About 65 percent of the privately owned acreage is in pasture and hay crops; about 20 percent is in row crops, mainly corn and tobacco; and about 15 percent is wooded.

The main limitation to use of the soils for row crops is the hazard of erosion.

4. *Shelocta-Rigley-Latham association*

Sloping to very steep, deep soils that have a loamy subsoil, on long side slopes; and sloping and moderately steep, moderately deep soils that have a clayey subsoil; on narrow ridgetops

The landscape of this association is mountainous. The ridgetops are narrow, and the side slopes are long and steep and very steep. The range in elevation from the ridgetops to the valley floor is about 200 feet. A sandstone cliff is on some of the side slopes, and stones that break away from the cliff litter the slope below.

This association makes up about 37 percent of Laurel County. Shelocta soils make up about 38 percent of this association, Rigley and Latham soils each make up about 16 percent, and minor soils make up the remaining 30 percent.

Shelocta soils are sloping to very steep soils mostly on lower side slopes. They are deep and well drained. The subsoil is silt loam or silty clay loam, and it is about 5 to 30 percent, by volume, coarse fragments.

Rigley soils are deep and steep and very steep soils on rugged side slopes. The surface layer and subsoil are mostly fine sandy loam, and they are about 10 to 25 percent, by volume, coarse fragments.

Latham soils are mostly sloping and moderately steep soils on ridgetops, but some are very steep soils on side slopes. They are moderately well drained, and they are moderately deep to soft shale. The subsoil is mostly silty clay or clay.

The minor soils in this association are Steinsburg, Whitley, and Lily soils on ridgetops; Cotaco soils on foot slopes; and Chagrin and Stendal soils on flood plains. Several areas of Strip mines are in this association.

The average farm in this association is about 80 acres in size and is operated by the owner. The Forest Service owns and manages about 45 percent of the

acreage in this association, almost all of which is wooded. Almost all the areas of side slopes are used for woodland. A few areas of soils on narrow ridgetops and in valleys are used for hay, pasture, corn, or tobacco. About 15 percent of the privately owned acreage is in pasture and hay crops; about 5 percent is in row crops, mainly corn and tobacco; and about 80 percent is wooded.

The main limitations to use of the soils for row crops are the hazard of erosion on all the soils and the difficulty of using equipment on the steep and very steep soils.

General Soil Map of Rockcastle County

1. Lily-Crider-Morehead, high base variant association

Nearly level and gently sloping, deep, well drained and somewhat poorly drained soils on ridgetops; and sloping and moderately steep, deep and moderately deep, well drained soils; on side slopes

The landscape of this association is a series of gently sloping ridges that break into short, sloping and moderately steep side slopes which descend to narrow valleys (fig. 5). A few areas have karst topography. The range in elevation from the ridgetops to the valley floor is about 50 to 150 feet.

This association makes up about 4 percent of Rockcastle County. Lily soils make up about 37 percent of this association; Crider soils, about 12 percent; Morehead variant soils, about 10 percent; and minor soils, the remaining 41 percent.

Lily soils are sloping and moderately steep soils on side slopes. They are moderately deep and well drained. The subsoil is clay loam and sandy clay loam. Lily soils formed in residuum weathered from sandstone.

Crider soils are gently sloping and sloping soils on ridgetops and side slopes. Most areas are irregularly dissected, but some areas have karst topography. These soils are deep and well drained. The subsoil is mostly silty clay loam. The Crider soils formed in residuum weathered from limestone.

Morehead variant soils are nearly level soils on ridgetops. They are deep and somewhat poorly drained. The subsoil is silt loam and silty clay loam. They formed in residuum weathered from limestone.

The minor soils in this association are Frederick, Bedford, Cotaco, and Weikert soils on ridgetops and side slopes and Newark and Nolin soils on flood plains.

The average farm in this association is about 70 acres in size and is operated by the owner. Most of this association is used for general farming. About 60 percent of the acreage is in pasture and hay crops; about 30 percent is in row crops, mainly corn and tobacco; and about 10 percent is wooded.

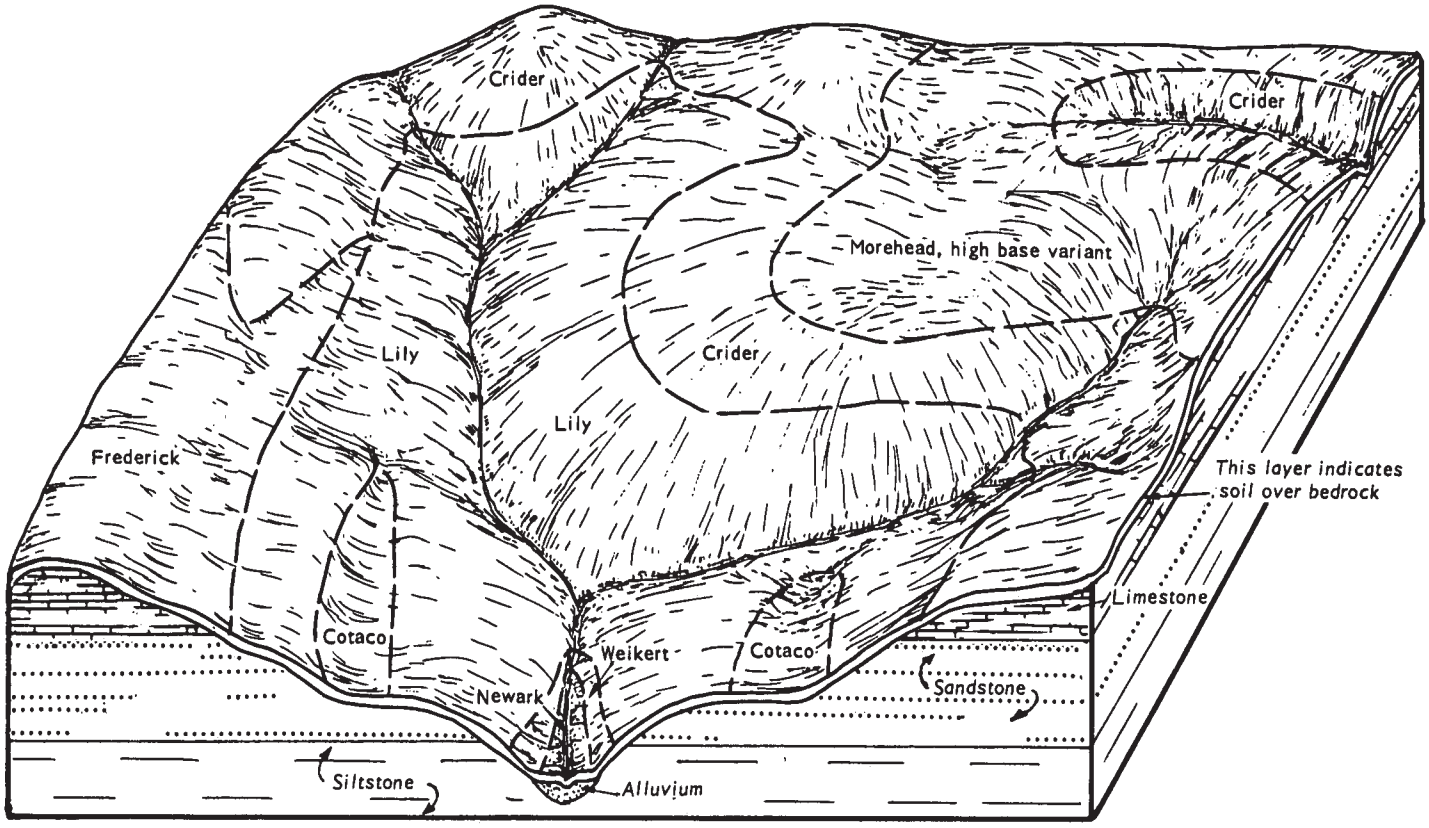

Figure 5.—**Pattern of soils and underlying material in Lily-Crider-Morehead association.**

The main limitations to use of the soils for row crops are the hazard of erosion on Lily and Crider soils and the seasonal high water table in Morehead variant soils.

2. *Frederick-Crider association*

Gently sloping to moderately steep, deep, well drained soils; on ridgetops and side slopes

The landscape of this association is a series of gently sloping ridges that gradually break into straight side slopes which descend to narrow valleys (fig. 6). In places karst topography is dominant, and isolated knobs of rocky soils are also present. The range in elevation from the ridgetops to the valley floor is about 50 to 150 feet.

This association makes up about 10 percent of Rockcastle County. Frederick soils make up about 30 percent of this association; Crider soils, about 15 percent; and minor soils, the remaining 55 percent.

Frederick soils are deep, gently sloping to moderately steep soils on ridgetops and side slopes. The subsoil is mostly silty clay or clay.

Crider soils are deep, gently sloping and sloping soils on the ridgetops and side slopes. Most areas are irregularly dissected, but some areas have karst topography. The subsoil is mostly silty clay loam.

The minor soils in this association are Caneyville, Hagerstown, Britwater, Opequon, Faywood, Bedford, and Weikert soils on ridgetops and side slopes and Newark and Nolin soils on flood plains.

The average farm in this association is about 70 acres in size and is operated by the owner. About 50 percent of the acreage is in pasture and hay; about 35 percent is in row crops, mainly corn and tobacco; and about 15 percent is wooded.

The main limitations to use of the soils for row crops is the hazard of erosion.

3. *Frederick-Crider-Caneyville association*

Gently sloping to moderately steep, deep, well drained soils mostly in valleylike positions between sloping to steep, moderately deep, well drained rocky soils; on hills

The landscape of this association consists of rocky hills that descend to valleys. The range in elevation from the hilltops to the valleys is about 100 to 200 feet.

This association makes up about 12 percent of Rockcastle County. Frederick soils make up about 13 percent of this association; Crider soils, about 9 percent; Caneyville soils, about 8 percent; and minor soils, the remaining 70 percent.

Frederick soils are deep, gently sloping to moderately

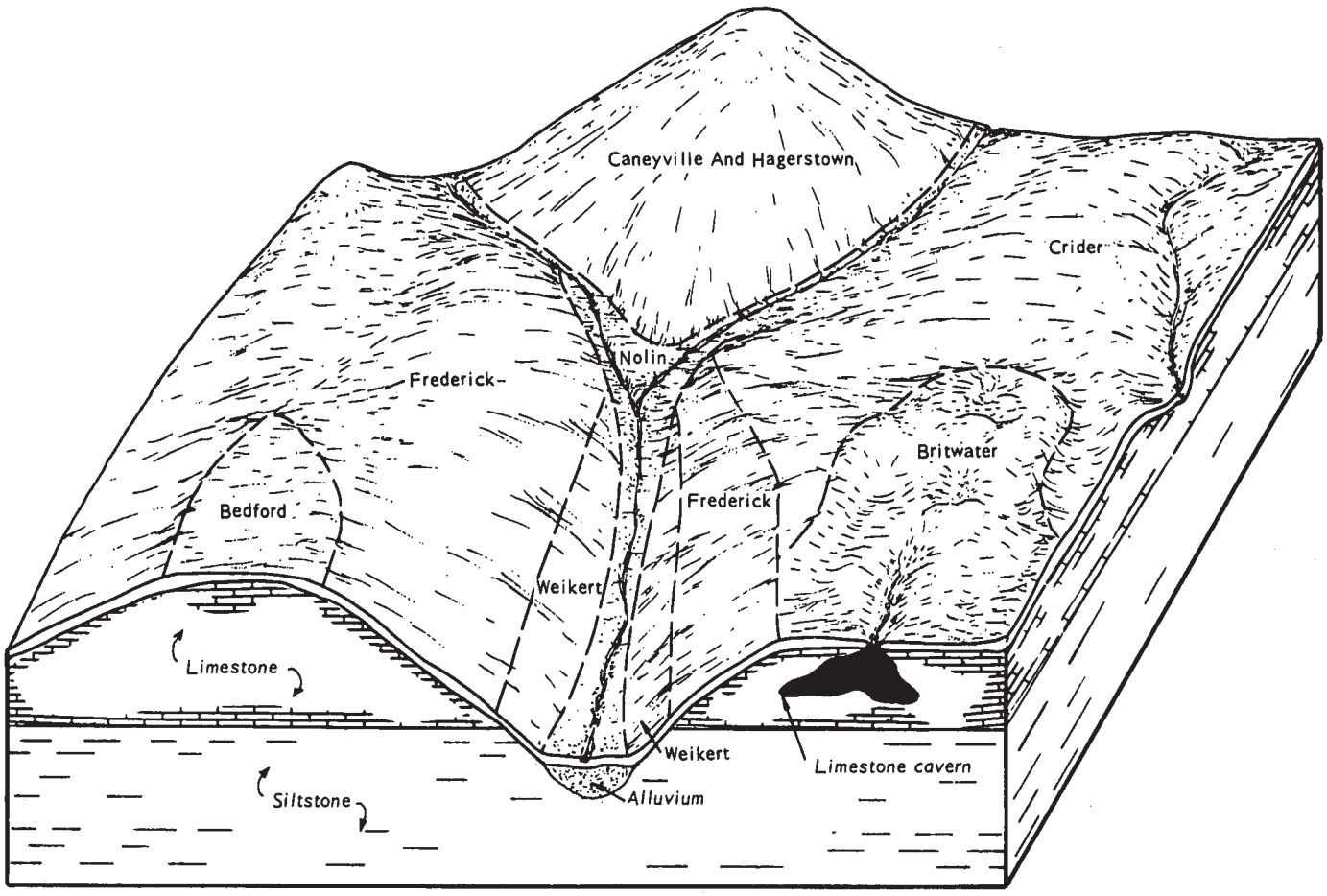

Figure 6.—**Pattern of soils and underlying material in Frederick-Crider association.**

steep soils in the valleys. The subsoil is mostly silty clay or clay.

Crider soils are deep, gently sloping and sloping soils and are also in the valleys. Most areas are irregularly dissected, but some areas have karst topography. The subsoil is mostly silty clay loam.

Caneyville soils are sloping to steep soils mostly on hillsides. They are moderately deep and rocky. The subsoil is mostly silty clay or clay.

The minor soils in this association are Hagerstown, Weikert, Opequon, Faywood, Brookside, Britwater, Latham, Lily, and Shelocta soils on ridgetops and side slopes and Newark and Nolin soils on flood plains.

The average farm in this association is about 100 acres in size and is operated by the owner. About 40 percent of the acreage is in pasture and hay; about 40 percent is wooded; and about 20 percent is in row crops, mainly corn and tobacco.

The main limitations to use of the soils for row crops are the hazard of erosion on all the soils and the difficulty of using equipment on the rocky Caneyville soils.

4. Shelocta-Rigley-Latham association

Sloping to very steep, deep soils that have a loamy subsoil, on long side slopes; and sloping and moderately steep, moderately deep soils that have a clayey subsoil; on narrow ridgetops

The landscape is mountainous. The ridgetops are narrow, and the side slopes are long and steep and very steep. The range in elevation from the ridgetops to the valley floor is about 200 feet. A sandstone cliff is on some of the side slopes, and stones that break away from the cliff litter the slope below.

This association makes up about 38 percent of Rockcastle County. Shelocta soils make up about 52 percent of this association, Rigley and Latham soils each make up about 11 percent, and minor soils make up the remaining 26 percent.

Shelocta soils are sloping to very steep soils mostly on lower side slopes. They are deep and well drained. The subsoil is silt loam or silty clay loam and is about 5 to 30 percent, by volume, coarse fragments.

Rigley soils are deep, steep and very steep soils on rugged side slopes. The surface layer and subsoil are mostly fine sandy loam and are about 10 to 25 percent, by volume, coarse fragments.

Latham soils are mostly sloping and moderately steep soils on ridgetops, but some are very steep soils on side slopes. They are moderately well drained and moderately deep to soft shale. The subsoil is mostly silty clay or clay.

The minor soils in this association are Steinsburg, Whitley, and Lily soils on ridgetops; Cotaco soils on foot slopes; and Chagrin and Stendal soils on flood plains. Several areas of Strip mines are in this association.

The average farm in this association is about 120 acres in size and is operated by the owner. The Forest Service owns and manages about 10 percent of the acreage in this association, almost all of which is wooded. Almost all the areas on side slopes are used for woodland. A few areas on narrow ridgetops and in valleys are used for hay, pasture, corn, or tobacco. About 15 percent of the privately owned acreage is in pasture and hay crops; about 5 percent is in row crops, mainly corn and tobacco; and about 80 percent is wooded.

The main limitations to use of the soils for row crops are the hazard of erosion on all the soils and the difficulty of using equipment on the steep and very steep soils.

5. Shelocta-Latham-Brookside association

Sloping to very steep, moderately deep and deep soils that mainly have a clayey subsoil, on ridgetops and upper side slopes; and sloping to very steep, deep soils that have a loamy subsoil; on lower side slopes

The landscape of this association is mountainous. The ridgetops and valleys are narrow, and the side slopes are long and steep or very steep. The soils on the upper side slopes formed in material weathered from sandstone, siltstone, and shale, and the soils on the lower side slopes formed in material weathered from limestone and shale. The range in elevation from the hilltops to the valleys is about 200 feet. A limestone cliff is on some of the lower side slopes, and stones that break away from the cliff litter the slope below.

This association makes up about 16 percent of Rockcastle County. Shelocta soils make up about 26 percent of this association; Latham soils, about 16 percent; Brookside soils, about 13 percent; and minor soils, the remaining 45 percent.

Shelocta soils are sloping to very steep soils mostly on lower side slopes. They are deep and well drained. The subsoil is silt loam or silty clay loam and is about 5 to 30 percent, by volume, coarse fragments.

Latham soils are sloping and moderately steep soils on ridgetops and steep and very steep soils on rugged side slopes. They are moderately well drained and moderately deep to soft shale. The subsoil is mostly silty clay or clay.

Brookside soils are very steep soils on lower side slopes. They are well drained and deep, but are mixed with Rock outcrop. The subsoil is silty clay loam to clay.

The minor soils in this association are Caneyville, Hagerstown, Faywood, Opequon, Lily, Whitley, Rigley, and Steinsburg soils, Strip mines, and Rock outcrops on ridgetops and side slopes and Newark, Nolin, and Chagrin soils on flood plains.

The average farm in this association is about 120 acres in size and is operated by the owner. About 60 percent of the acreage is in woods; about 30 percent, in pasture and hay crops; and about 10 percent, in row crops, mainly corn and tobacco.

The main limitations to use of the soils for row crops are the hazard of erosion on all the soils and the difficulty of using machinery on the rocky Brookside soils and on the steep and very steep soils.

6. Weikert-Latham association

Very steep, shallow, channery soils that have a loamy subsoil, on upper side slopes; and moderately steep, moderately deep soils that have a clayey subsoil; on lower side slopes

The ridgetops of this association are narrow, the upper side slopes are very steep (fig. 7), and the lower side slopes are short. The bottoms and terraces are

Figure 7.—**Typical topography in Weikert-Latham association. The very steep soil in the background is Weikert channery silt loam.**

relatively wide. The range in elevation from the ridgetops to the valley floor is about 200 feet.

This association makes up about 20 percent of Rockcastle County. Weikert soils make up about 30 percent of this association; Latham soils, about 17 percent; and minor soils, the remaining 53 percent.

Weikert soils are very steep soils on upper side slopes. They are shallow and well drained. They are channery silt loam throughout.

Latham soils are moderately steep soils on lower side slopes. They are moderately well drained and moderately deep to soft shale. The subsoil is mostly silty clay or clay.

The minor soils in this association are Berea, Colyer, Whitley, Lily, and Frederick soils on ridgetops and side slopes and Tilsit, Stendal, and Bonnie soils on stream terraces and flood plains.

The average farm in this association is about 110 acres in size and is operated by the owner. Most of this association is used for general farming or woodland. About 40 percent of the acreage is in pasture and hay; about 40 percent is wooded; and about 20 percent is in row crops, mainly corn and tobacco.

The main limitations to use of the soils for row crops are the hazard of erosion on all the soils and the difficulty of using equipment on the very steep Weikert soils.

Descriptions of the Soils

This section describes the soil series and mapping units in Laurel and Rockcastle Counties. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the

layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for moist soil unless otherwise stated. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Strip mines, for example, do not belong to a soil series, but nevertheless, they are listed in alphabetic order along with the soil series.

Preceding the name of each mapping unit is a symbol that identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and woodland suitability group in which the mapping unit has been placed. The page for the description of each capability unit can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*9*).[2]

Allegheny Series

The Allegheny series consists of deep, well drained soils that formed in alluvium or colluvium derived mainly from sandstone and shale. These soils are on stream terraces and toe slopes.

In a representative profile the surface layer is dark brown loam about 10 inches thick. The subsoil to a depth of 18 inches is yellowish brown, very friable loam and, to a depth of 42 inches, is yellowish brown, friable light clay loam. The substratum to a depth of 62 inches is yellowish brown, friable light clay loam that has gray mottles.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low.

Representative profile of Allegheny loam, 2 to 6 percent slopes, about 1,000 feet west of a road junction, which is about 2 miles north of Bush School on State Road 80 in southeast Laurel County:

Ap–0 to 10 inches; dark brown (10YR 4/3) loam: weak fine granular structure; very friable; very strongly acid; clear smooth boundary.

B1—10 to 18 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; very friable; very strongly acid; gradual wavy boundary.

B2t—18 to 42 inches; yellowish brown (10YR 5/6) light clay loam; weak fine subangular blocky structure; friable; few clay bridges; very strongly acid; gradual wavy boundary.

C—42 to 62 inches; yellowish brown (10YR 5/6) light clay loam; many fine prominent gray (10YR 6/1) mottles; massive; friable; very strongly acid.

Thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Pebbles make up 0 to 5 percent, by volume, of the A, B, and C horizons.

The Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). The B horizon is yellowish brown (10YR 5/4, 5/6), dark yellowish brown (10YR 4/4) strong brown (7.5YR 5/6), or dark brown (7.5YR 4/4). The B2t horizon is light clay loam or sandy clay loam. The C horizon is brown (10YR 5/3), yellowish brown (10YR 5/4, 5/6), or strong brown (7.5YR 5/6) clay loam, sandy clay loam, loam, or sandy loam. In some profiles the C horizon is not mottled, but in others it is mottled with brown or gray.

Allegheny soils are near Cotaco; Whitley, terrace; and Stendal soils. Allegheny soils are better drained than moderately well drained Cotaco soils. They contain more sand throughout the profile than Whitley, terrace, soils. They contain more sand in the A and B horizons and are better drained than somewhat poorly drained Stendal soils.

AlB—Allegheny loam, 2 to 6 percent slopes. This soil in on stream terraces or toe slopes. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Cotaco and Whitley, terrace, soils. Also included are areas of a soil that is similar to Allegheny soils but is less acid, is gravelly in the subsoil, has a surface layer of fine sandy loam, and has bedrock at a depth of as shallow as 3 feet. In addition to these areas, a few areas where slopes are less than 2 percent and a few areas that have karst topography were included.

The effective rooting depth is more than 60 inches. The hazard of erosion is moderate in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area, and it is used mostly for hay and pasture. Capability unit IIe–1; woodland suitability group 2o1.

AlC—Allegheny loam, 6 to 12 percent slopes. This soil is on stream terraces or toe slopes.

Included with this soil in mapping were small areas of Whitley, terrace, soils and areas of a soil that is similar to Allegheny soils but is less acid, is gravelly in the subsoil, has a surface layer of fine sandy loam, and has bedrock at a depth of as shallow as 3 feet. Also included were a few areas that have karst topography.

The effective rooting depth is more than 60 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area, and it is used mostly for hay and pasture. Capability unit IIIe–1; woodland suitability group 2o1.

Bedford Series

The Bedford series consists of deep, moderately well drained soils that formed in residuum weathered from

[2] Italic numbers in parentheses refer to Literature Cited, p. 94.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Mapping unit	Laurel County		Rockcastle County		Laurel-Rockcastle area	
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Allegheny loam, 2 to 6 percent slopes	1,260	0.4	520	0.3	1,780	0.4
Allegheny loam, 6 to 12 percent slopes	440	.1	370	.2	810	.2
Bedford silt loam, 2 to 6 percent slopes	0	----------	1,770	.9	1,770	.4
Berea silt loam, 6 to 12 percent slopes	0	----------	580	.3	580	.1
Berea silt loam, 12 to 20 percent slopes	0	----------	1,300	.7	1,300	.3
Bonnie silt loam	3,010	1.1	150	.1	3,160	.7
Bonnie silt loam, terrace	610	.2	220	.1	830	.2
Britwater cherty silt loam, 2 to 6 percent slopes	0	----------	720	.4	720	.1
Britwater cherty silt loam, 6 to 12 percent slopes	0	----------	2,250	1.1	2,250	.5
Brookside-Faywood-Rock outcrop complex, 30 to 65 percent slopes	20	(1)	11,340	5.7	11,360	2.3
Caneyville-Hagerstown rocky silt loams, 6 to 20 percent slopes	0	----------	6,350	3.2	6,350	1.3
Caneyville-Hagerstown rocky silt loams, 20 to 30 percent slopes	0	----------	2,470	1.2	2,470	.5
Caneyville-Shelocta rocky silt loams, 6 to 20 percent slopes	0	----------	970	.5	970	.2
Caneyville-Shelocta rocky silt loams, 20 to 30 percent slopes	0	----------	7,320	3.7	7,320	1.5
Chagrin loam	300	.1	1,760	.9	2,060	.4
Colyer silt loam, silty subsoil variant, 12 to 20 percent slopes	0	----------	720	.4	720	.1
Cotaco loam	680	.2	870	.4	1,550	.3
Crider silt loam, 2 to 6 percent slopes	0	----------	3,800	1.9	3,800	.8
Crider silt loam, 6 to 12 percent slopes	0	----------	2,570	1.3	2,570	.5
Cuba silt loam	1,010	.4	60	(1)	1,070	.2
Donahue rocky sandy loam, 40 to 75 percent slopes	0	----------	1,950	1.0	1,950	.4
Faywood-Opequon-Rock outcrop complex, 12 to 30 percent slopes	0	----------	4,990	2.5	4,990	1.0
Frederick silt loam, 2 to 6 percent slopes	0	----------	1,200	.6	1,200	.2
Frederick silt loam, 6 to 12 percent slopes	0	----------	5,660	2.8	5,660	1.2
Frederick silt loam, 12 to 20 percent slopes	0	----------	4,170	2.1	4,170	.9
Frederick silty clay loam, 12 to 20 percent slopes, severely eroded	0	----------	640	.3	640	.1
Jefferson-Latham complex, 25 to 40 percent slopes	2,190	.8	1,400	.7	3,590	.7
Latham silt loam, 2 to 6 percent slopes	530	.2	10	(1)	540	.1
Latham silt loam, 6 to 12 percent slopes	12,910	4.5	2,080	1.0	14,990	3.0
Latham silt loam, 12 to 20 percent slopes	13,270	4.7	3,970	2.0	17,240	3.6
Latham silty clay loam, 12 to 20 percent slopes, severely eroded	800	.3	5,530	2.8	6,330	1.3
Latham-Lily complex, 6 to 20 percent slopes	3,200	1.1	1,130	.6	4,330	.9
Lily loam, 2 to 6 percent slopes	3,160	1.1	90	(1)	3,250	.7
Lily loam, 6 to 12 percent slopes	13,610	4.8	3,500	1.8	17,110	3.5
Lily fine sandy loam, 12 to 20 percent slopes	8,400	2.9	4,500	2.3	12,900	2.7
Lily and Steinsburg fine sandy loams, 20 to 30 percent slopes	7,680	2.7	1,720	.9	9,400	1.9
Lindside silt loam	0	----------	310	.2	310	.1
Morehead silt loam	1,660	.6	610	.3	2,270	.5
Morehead silt loam, high base variant	0	----------	1,580	.8	1,580	.3
Newark silt loam	0	----------	3,100	1.6	3,100	.6
Newark gravelly silt loam, gravelly variant	0	----------	610	.3	610	.1
Nolin silt loam	30	(1)	1,250	.6	1,280	.3
Pope fine sandy loam	1,270	.4	590	.3	1,860	.4
Rigley stony fine sandy loam, 30 to 60 percent slopes	7,310	2.6	0	----------	7,310	1.5
Shelocta gravelly silt loam, 6 to 12 percent slopes	180	.1	950	.5	1,130	.2
Shelocta gravelly silt loam, 12 to 20 percent slopes	480	.2	2,220	1.1	2,700	.6
Shelocta gravelly silt loam, 20 to 30 percent slopes	990	.3	4,660	2.3	5,650	1.2
Shelocta stony silt loam, 30 to 50 percent slopes	13,960	4.9	6,660	3.3	20,620	4.3
Shelocta-Latham silt loams, 12 to 20 percent slopes	2,610	.9	1,040	.5	3,650	.8
Shelocta-Latham silt loams, 20 to 30 percent slopes	35,730	12.5	9,930	5.0	45,660	9.4
Shelocta-Latham silt loams, 30 to 50 percent slopes	39,190	13.8	14,920	7.5	54,110	11.2
Shelocta-Rigley complex, 20 to 30 percent slopes	1,000	.3	6,770	3.4	7,770	1.6
Shelocta-Rigley complex, 30 to 50 percent slopes	24,570	8.6	21,410	10.7	45,980	9.6
Steff silt loam	1,000	.4	0	----------	1,000	.2
Steinsburg sandy loam, 6 to 12 percent slopes	1,220	.4	140	.1	1,360	.3
Steinsburg rocky sandy loam, 12 to 20 percent slopes	1,460	.5	740	.4	2,200	.5
Steinsburg rocky sandy loam, 20 to 50 percent slopes	9,200	3.2	5,420	2.7	14,620	3.0
Stendal silt loam	10,490	3.7	1,330	.7	11,820	2.4
Stendal silt loam, terrace	2,970	1.0	2,350	1.2	5,320	1.0
Stendal fine sandy loam, sandy variant	270	.1	240	.1	510	.1
Strip mines	3,110	1.1	850	.4	3,960	.8
Tilsit silt loam, 2 to 6 percent slopes	1,640	.6	1,000	.5	2,640	.5
Tilsit silt loam, 6 to 12 percent slopes	30	(1)	1,560	.8	1,590	.3
Weikert channery silt loam, 40 to 80 percent slopes	0	----------	15,800	7.8	15,800	3.3
Whitley silt loam, 2 to 6 percent slopes	16,870	5.9	620	.3	17,490	3.6

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Mapping unit	Laurel County		Rockcastle County		Laurel-Rockcastle area	
Whitley silt loam, 6 to 12 percent slopes	19,260	6.8	2,340	1.2	21,600	4.5
Whitley silt loam, 12 to 20 percent slopes	8,340	2.9	430	.2	8,770	1.8
Whitley silt loam, terrace, 0 to 2 percent slopes	160	.1	420	.2	580	.1
Whitley silt loam, terrace, 2 to 6 percent slopes	1,170	.4	140	.1	1,310	.3
Whitley silt loam, terrace, 6 to 12 percent slopes	210	.1	60	(1)	270	.1
Water	5,790	2.0	340	.2	6,130	1.3
Totals	285,250	100.0	199,040	100.0	484,290	100.0

[1] Less than 0.05 percent.

limestone. These soils have a fragipan in the subsoil. They are mostly on upland ridgetops.

In a representative profile the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of 11 inches is yellowish brown, friable silt loam and, to a depth of 23 inches, is yellowish brown, friable light silty clay loam. The fragipan to a depth of 45 inches is brown, very firm light silty clay loam that has gray and red mottles. The subsoil to a depth of 65 inches is red, firm silty clay that has yellowish brown mottles.

Available water capacity is moderate, and permeability in the fragipan is very slow. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 18 to 24 inches.

Representative profile of Bedford silt loam, 2 to 6 percent slopes, about 3,000 feet northwest of Brindle Ridge Church, which is about 8 miles north of Mount Vernon in Rockcastle County:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; slightly acid; clear smooth boundary.

B1—8 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; common roots; slightly acid; clear smooth boundary.

B21t–11 to 23 inches; yellowish brown (10YR 5/6) light silty clay loam; moderate fine and medium subangular blocky structure; friable; few roots; few thin clay films; extremely acid; clear irregular boundary.

Bxt—23 to 45 inches; brown (10YR 5/3) light silty clay loam; common fine distinct light gray (10YR 7/2) and yellowish red (5YR 4/6) mottles; moderate very coarse prismatic structure; very firm; brittle and compact; few thin clay films; extremely acid; gradual wavy boundary.

IIB22t—45 to 65 inches; red (2.5YR 4/6) silty clay; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; 5 percent chert fragments; few thin clay films; extremely acid.

Thickness of the solum ranges from 50 to 80 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is very strongly acid or extremely acid, but in places the reaction of horizons at or near the surface has been altered by liming. Depth to the fragipan ranges from 20 to 30 inches.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B1 horizon is yellowish brown (10YR 5/4, 5/6). The B21t horizon is yellowish brown (10YR 5/4, 5/6) or strong brown (7.5YR 5/6). In some profiles a 2 or 3 inch thick horizon that has gray mottles is above the fragipan. The Bxt horizon is brown (10YR 5/3) or yellowish brown (10YR 5/4, 5/6) and has mottles in shades of gray, brown, and red. The lower part of some profiles has mottles without a dominant matrix color. The B horizon above the IIB horizon is silt loam or light silty clay loam. The IIB horizon in some profiles has mottles that have a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2.

Bedford soils are near Frederick, Crider, and Morehead, high base variant, soils. Bedford soils, unlike Frederick and Crider soils, have a fragipan. They are browner and less clayey in the B horizon than Frederick soils, and they are not as well drained as Crider soils. They are better drained than Morehead, high base variant, soils.

BdB—Bedford silt loam, 2 to 6 percent slopes. This soil is mostly on ridgetops.

Included with this soil in mapping were small areas of Crider and Morehead, high base variant, soils. Also included were a few areas where slopes are less than 2 percent.

The effective rooting depth is 20 to 30 inches. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most of the crops and pasture and hay plants commonly grown in the area. Alfalfa is generally short lived because of excess water in the rooting zone caused by the very slow permeability of the fragipan. This soil is used mostly for corn, hay, and pasture. Capability unit IIe–4; woodland suitability group 3w1.

Berea Series

The Berea series consists of moderately deep, moderately well drained soils that formed in residuum

weathered from siltstone and shale. These soils are on the sides of upland ridges.

In a representative profile the surface layer is grayish brown silt loam about 6 inches thick. The subsoil to a depth of 21 inches is yellowish brown, friable light silty clay loam that has a few light gray mottles. The substratum to a depth of 25 inches is mottled, very firm silty clay. Rippable shale bedrock extends to a depth of 36 inches. Hard siltstone is at a depth of 36 inches.

Available water capacity is moderate, and permeability is moderately slow. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 18 to 30 inches.

Representative profile of Berea silt loam, 12 to 20 percent slopes, about 1 mile northwest of Roundstone School, which is about 6 miles north of Mount Vernon in Rockcastle County:

Ap—0 to 6 inches; grayish brown (2.5Y 5/2) silt loam; weak fine granular structure; very friable; very strongly acid; clear smooth boundary.

B2t—6 to 21 inches; yellowish brown (10YR 5/6) light silty clay loam; few fine distinct light gray (10YR 7/1) mottles in lower part; moderate fine and medium subangular blocky structure; friable; thin clay films on peds; common roots; extremely acid; gradual wavy boundary.

IIC—21 to 25 inches; mottled red (2.5YR 4/6), pale brown (10YR 6/3), and light gray (10YR 7/1) silty clay; massive; very firm; few roots; 10 percent shale fragments; extremely acid; clear wavy boundary.

IIR1—25 to 36 inches; gray, red, and brown rippable shale that weathers to acid silty clay.

IIIR2—36 inches; hard siltstone.

Thickness of the solum ranges from 20 to 35 inches. Depth to hard siltstone bedrock is 20 to 40 inches. Throughout the profile the soil material is strongly acid to extremely acid, but in places the reaction of horizons at or near the surface has been altered by liming. Coarse fragments of less than 3 inches in diameter make up 0 to 5 percent, by volume, of the Bt horizon and 10 to 30 percent, by volume, of the IIC horizon.

The Ap horizon is grayish brown (2.5Y 5/2 or 10YR 5/2), brown (10YR 5/3), dark grayish brown (10YR 4/2), or dark brown (10YR 4/3). The Bt horizon is yellowish brown (10YR 5/6) or strong brown (7.5YR 5/6) and has gray mottles in the lower part. The fine earth fraction of the IIC horizon is silty clay loam, silty clay, or clay. Some profiles do not have a IIC horizon.

Berea soils are near Whitley and Weikert soils. Berea soils are not as deep to bedrock as Whitley soils. They are deeper to bedrock than Weikert soils, and they have a much lower content of coarse fragments than those soils.

BgC—Berea silt loam, 6 to 12 percent slopes. This soil is on side slopes of ridges.

Included with this soil in mapping were a few areas of a severely eroded soil, which, when plowed and mixed, has a yellower and more clayey surface layer than this soil and in places contains more coarse fragments than the soil described as representative of the series.

The effective rooting depth is 20 to 40 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. It is used mostly for hay and pasture. Capability unit IIIe–3; woodland suitability group 3w1.

BgD—Berea silt loam, 12 to 20 percent slopes. This soil is on the side slopes of ridges. It has the profile described as representative of the series.

Included with this soil in mapping were areas of a severely eroded soil which, when plowed and mixed, has a yellower and more clayey surface layer and in places contains more coarse fragments than the soil described as representative of the series. Also included were a few areas in which bedrock is at a depth of less than 20 inches.

The effective rooting depth is 20 to 40 inches. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suited to occasional cultivation. It is suited to grasses and legumes commonly grown in the area. Capability unit IVe–1; woodland suitability group 3w1.

Bonnie Series

The Bonnie series consists of deep, poorly drained soils that formed in alluvium washed mainly from soils on the uplands that are underlain by sandstone, siltstone, and shale. These soils are on stream bottoms and low terraces along streams.

In a representative profile the surface layer is gray silt loam about 9 inches thick. The subsoil to a depth of 30 inches is gray, very friable silt loam. The substratum to a depth of 60 inches is gray, very friable silt loam.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 0 to 6 inches.

Representative profile of Bonnie silt loam, about 1,300 feet southeast of Blackwater United Baptist Church, which is about 15 miles southeast of London in Laurel County:

Ap—0 to 9 inches; gray (10YR 6/1) silt loam; common fine distinct dark brown (10YR 4/3) mottles; weak fine granular structure; very friable; slightly acid; clear smooth boundary.

B2g—9 to 30 inches; gray (10YR 6/1) silt loam; few fine distinct dark brown (10YR 4/3) mottles; weak fine granular structure; very friable; very strongly acid; gradual smooth boundary.

Cg—30 to 60 inches; gray (10YR 6/1) silt loam; few fine distinct dark brown (10YR 4/3) and yellowish brown (10YR 5/6) mottles; massive; very friable; very strongly acid.

Thickness of the solum ranges from 30 to 40 inches. Depth to bedrock is more than 5 feet. Throughout the

profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming.

The Ap horizon has dominant colors in a hue of 10YR, a value of 5 or 6, and a chroma of 1 or 2. The B and C horizons have dominant colors in a hue of 10YR or 2.5Y, a value of 6 or 7, and a chroma of 1 or 2. The lower part of the C horizon ranges from silt loam to sandy loam.

Bonnie soils are near Stendal soils. Bonnie soils are poorly drained, and Stendal soils are somewhat poorly drained.

Bn—Bonnie silt loam (0 to 2 percent slopes). This soil is on the flood plains of streams. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Stendal soils; small areas where slopes are slightly steeper than 2 percent, such as banks along old stream channels; and small areas of poorly drained soils that are less acid than Bonnie soils. Also included were gravely spots, small areas that are as shallow as 3½ feet to bedrock, and areas of a poorly drained sandy soil.

The effective rooting depth is limited by the seasonal high water table, which also interferes with tillage. Overflow is a hazard, especially late in winter or early in spring. This soil is poorly drained, and artificial drainage is needed to lower the water table during wet seasons.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area. It is not suited to alfalfa, tobacco, and small grains. Capability unit IIIw–1, woodland suitability group 1w2.

Bo—Bonnie silt loam, terrace (0 to 2 percent slopes). This soil is mostly on stream terraces that are a few feet above the flood plain of the stream, but a few areas are on fans and flood plains along tributary streams.

Included with this soil in mapping were small areas of Stendal, terrace, soils and small areas where bedrock is as shallow as 3½ feet.

The effective rooting depth is limited by the seasonal high water table, which also interferes with tillage. This soil is poorly drained, and artificial drainage is needed to lower the water table during wet seasons.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area. It is not suited to alfalfa. If not properly drained, this soil is unsuited to plants that do not tolerate wetness. Capability unit IIIw–1; woodland suitability group 1w2.

Britwater Series

The Britwater series consists of deep, well drained soils that formed in residuum weathered from limestone. These soils are on ridgetops and side slopes.

In a representative profile the surface layer is dark brown cherty silt loam about 10 inches thick. The subsoil to a depth of 18 inches is dark yellowish brown, friable cherty silt loam and, to a depth of 65 inches, is reddish brown, friable cherty light silty clay loam.

Available water capacity is high, and permeability is moderate. Natural fertility is high, and organic matter content is low to medium.

Representative profile of Britwater cherty silt loam, 6 to 12 percent slopes, about 800 feet southeast of Union Chapel Church, which is about 5 miles northwest of Mount Vernon in Rockcastle County:

Ap—0 to 10 inches; dark brown (10YR 4/3) cherty silt loam; weak fine granular structure; very friable; many roots; 25 percent chert fragments; slightly acid; clear smooth boundary.

B1—10 to 18 inches; dark yellowish brown (10YR 4/4) cherty silt loam; weak fine subangular blocky structure; friable; common roots; 30 percent chert fragments; medium acid; gradual wavy boundary.

B2t—18 to 65 inches; reddish brown (5YR 4/4) cherty light silty clay loam; moderate fine and medium subangular blocky structure; friable; few roots; 30 percent chert fragments; few thin clay films; strongly acid.

Thickness of the solum ranges from 60 to 100 inches. Depth to bedrock is more than 6 feet. Throughout the profile the soil material is medium acid to strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Chert fragments make up 15 to 30 percent, by volume, of the profile.

The Ap horizon is dark brown (7.5YR 4/4 or 10YR 4/3). The B1 horizon is dark brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4). The B2 horizon is dark brown (7.5YR 4/4) to yellowish red (5YR 4/6). Some profiles have a IIB2t horizon that is red (2.5YR 4/6) or yellowish red (5YR 4/6) silty clay or clay.

Britwater soils are near Frederick and Crider soils. Britwater soils are much more cherty and have less clay in the Bt horizon than Frederick soils. They are much more cherty than Crider soils.

BtB—Britwater cherty silt loam, 2 to 6 percent slopes. This soil is on the ridgetops and side slopes. Some areas have karst topography.

Included with this soil in mapping were areas of a soil that is similar to Britwater soils, but it has a very dark grayish brown surface layer. Also included was a soil that is more acid in the subsoil than this soil and areas of Frederick, Nolin, and Crider soils.

The effective rooting depth is more than 60 inches. The hazard of erosion is moderate in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. Capability unit IIe–2; woodland suitability group 2o1.

BtC—Britwater cherty silt loam, 6 to 12 percent slopes. This soil is on ridgetops and side slopes. Some areas have karst topography. This soil has the profile described as representative of the series.

Included with this soil in mapping were areas of a soil that is similar to Britwater soils, but it has a very dark grayish brown surface layer. Also included were areas of a soil that is more acid in the subsoil than this soil and areas of Frederick, Nolin, and Crider soils.

The effective rooting depth is more than 60 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. Capability unit IIIe–2; woodland suitability group 2o1.

Brookside Series

The Brookside series consists of deep, well drained soils that formed in colluvium weathered from shale and limestone. These soils are on lower side slopes.

In a representative profile the surface layer is dark brown silt loam about 4 inches thick. The subsoil is yellowish brown or strong brown, friable light silty clay loam to a depth of 16 inches; dark brown, friable heavy silty clay loam and silty clay to a depth of 36 inches; and brown, firm silty clay to a depth of 50 inches. The substratum to a depth of 72 inches is strong brown, firm clay. Olive hard shale is at a depth of 72 inches.

Available water capacity is high, and permeability is moderately slow. Natural fertility is medium, and organic matter content is low.

Representative profile of Brookside silt loam in an area of Brookside-Faywood-Rock outcrop complex, 30 to 65 percent slopes, about 100 yards southeast of the intersection of New Hope Tower Road and Brush Creek Road in Rockcastle County:

O11—1½ inches to ½ inch; deciduous leaves and twigs.

O12—½ inch to 0; partly decomposed deciduous leaves and twigs.

A1—0 to 4 inches; dark brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; 5 percent coarse fragments; common roots; neutral; abrupt smooth boundary.

B11—4 to 10 inches; yellowish brown (10YR 5/6) light silty clay loam; weak medium subangular blocky structure; friable; 5 percent coarse fragments; common roots; neutral; clear smooth boundary.

B12t—10 to 16 inches; strong brown (7.5YR 5/6) light silty clay loam; weak fine and medium subangular blocky structure; friable; distinct patchy clay films on peds; 5 percent coarse fragments; few roots; neutral; clear wavy boundary.

B21t—16 to 24 inches; dark brown (7.5YR 4/4) heavy silty clay loam; moderate fine subangular blocky structure; friable; distinct broken clay films on peds; 5 percent coarse fragments; few roots; neutral; clear wavy boundary.

B22t—24 to 36 inches; dark brown (7.5YR 4/4) silty clay; common medium faint dark brown (7.5YR 3/2) mottles; moderate fine and medium subangular blocky structure; friable; prominent broken clay films on peds; 5 percent coarse fragments; few roots; neutral; clear wavy boundary.

B3t—36 to 50 inches; brown (7.5YR 5/4) silty clay; common medium faint dark brown (7.5YR 3/2) and reddish yellow (7.5YR 6/6) mottles; weak medium subangular blocky structure; firm; distinct patchy clay films on peds; 5 percent coarse fragments; few roots; neutral; gradual wavy boundary.

C—50 to 72 inches; strong brown (7.5YR 5/6) clay; many coarse distinct reddish yellow (7.5YR 6/8) and pale brown (10YR 6/3) mottles; massive; firm; 15 percent shale fragments; few very fine roots; neutral; abrupt wavy boundary.

R—72 inches; olive (5Y 5/4) hard shale.

Thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is medium acid to mildly alkaline. Coarse fragments smaller than stones make up 5 to 15 percent, by volume, of the material throughout the profile.

The A1 horizon is 3 to 6 inches thick. It is dark brown (10YR 4/3) or very dark grayish brown (10YR 3/2). The B1 horizon is yellowish brown (10YR 5/6) or strong brown (7.5YR 5/6) silt loam or light silty clay loam. The B2t horizon is dark brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4) heavy silty clay loam, silty clay, or clay.

Brookside soils are near Faywood soils and Rock outcrops. Brookside soils are deeper to bedrock than Faywood soils.

BxF—Brookside-Faywood-Rock outcrop complex, 30 to 65 percent slopes. This complex is on lower side slopes. The Brookside and Faywood soils have the profiles described as representative of their respective series. Brookside and Faywood soils are not in a regular pattern, but Rock outcrops are typically near a discontinuous limestone cliff, which is in the majority of the areas. Loose stones and boulders that have broken away from the cliff above are commonly on the surface of the soils in this complex. Stones are on the surface and throughout the profile. The stones and boulders range from about 1 to 3 feet in diameter and tend to be more flat than round. Ledges crop out on the surface of the soils in this complex.

The Brookside soil typically makes up about 50 percent of this complex, the Faywood soil about 25 percent, and Rock outcrop about 25 percent.

Included with this complex in mapping were areas of a soil that is generally just below the cliff and in coves and has a very dark grayish brown surface layer as much as 20 inches thick. Also included were small areas of Caneyville and Shelocta soils.

The effective rooting depth is more than 60 inches in the Brookside soil and 20 to 40 inches in the Faywood soil. The soil material near and surrounding the Rock outcrop is shallow to bedrock.

Soils in this complex are so steep, so rocky, or both that they are poorly suited to uses other than woodland or wildlife habitat. Most areas are wooded. Capability unit VIIs–2; woodland suitability group 2x1 on north- and east-facing slopes and 3x1 on south- and west-facing slopes.

Caneyville Series

The Caneyville series consists of moderately deep, well drained soils that formed in residuum weathered from limestone. These soils are on upland side slopes.

In a representative profile the surface layer is dark

brown silt loam about 6 inches thick. The subsoil is yellowish red, friable light silty clay loam to a depth of 12 inches; is red, firm silty clay to a depth of 32 inches; and is reddish brown, very firm clay to a depth of 38 inches. Limestone bedrock is at a depth of 38 inches.

Available water capacity is moderate, and permeability is moderately slow. Natural fertility is medium, and organic matter content is low.

Representative profile of Caneyville silt loam in an area of Caneyville-Hagerstown rocky silt loams, 6 to 20 percent slopes, about 2 miles east of Quail and about 4¾ miles southwest of Mount Vernon on the north side of State Road 618 in Rockcastle County:

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; slightly acid; clear smooth boundary.

B1t—6 to 12 inches; yellowish red (5YR 4/6) light silty clay loam; moderate fine and medium subangular blocky structure; friable; few roots; few thin clay films; strongly acid; gradual wavy boundary.

B21t—12 to 32 inches; red (2.5YR 4/6) silty clay; moderate medium angular blocky structure; firm; thin clay films; strongly acid; gradual wavy boundary.

B22t—32 to 38 inches; reddish brown (5YR 4/4) clay; strong coarse angular blocky structure; very firm; thin clay films; neutral; abrupt wavy boundary.

R—38 inches; hard gray limestone.

Thickness of the solum ranges from 20 to 40 inches. Depth to bedrock is 20 to 40 inches. The soil material is strongly acid throughout the profile, but the reaction of horizons at or near the surface has been altered by liming in places, and the horizon just above the limestone bedrock is slightly acid to mildly alkaline. Pebbles make up 0 to 10 percent, by volume, of the A horizon and upper part of the B horizon.

The A horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 3. The B1t horizon is strong brown (7.5YR 5/6) or yellowish red (5YR 4/6) silt loam or light silty clay loam. The B21t horizon has a hue of 5YR of 2.5YR, a value of 4 or 5, and a chroma of 4 to 6. It is silty clay or clay. The B22t horizon is the same color as the B21t horizon but in some profiles it is mottled with colors in a hue of 10YR or 7.5YR, a value of 5 or 6, and a chroma of 4 to 6. The B22t horizon is silty clay or clay. Some profiles have a C horizon that is red, brown, olive, or gray silty clay or clay.

Caneyville soils are near Hagerstown, Frederick, Faywood, Opequon, and Shelocta soils. Caneyville soils are not as deep to bedrock as Hagerstown and Frederick soils. They are more acid in the upper part of the B horizon and deeper to bedrock than Opequon soils. They are not as deep to bedrock as Shelocta soils and are much more clayey in the B horizon than those soils.

CcD—Caneyville-Hagerstown rocky silt loams, 6 to 20 percent slopes. This complex is on side slopes of ridges. Some areas have karst topography. Caneyville and Hagerstown soils have the profiles described as representative of their respective series. Each soil, along with outcroppings of rock, is randomly spaced throughout the areas.

The Caneyville soil typically makes up about 65 percent of the complex, but in some areas makes up 45 to 80 percent; the Hagerstown soil typically makes up about 25 percent, but in some areas makes up 15 to 40 percent; and outcrops of limestone typically make up about 10 percent, but in some areas make up 5 to 15 percent (fig. 8). In some areas a few pieces of sandstone are on the surface, and the soil material is gravelly in spots.

Included with this complex in mapping were areas of an eroded soil that, if plowed and mixed, has a redder surface layer than the soil described as representative of either series. In places this layer contains more clay than the one in the representative soil. A few areas where slopes are as much as 30 percent were included. Also included were areas of Frederick, Faywood, and Opequon soils.

The effective rooting depth is 20 to 40 inches in the Caneyville soil and 40 to 60 inches or more in the Hagerstown soil.

This complex generally is not suited to cultivated crops because of the difficulty of operating equipment over or around the limestone outcrops. This complex is suited to the grasses and legumes commonly grown in the area. It is also suited to trees. Capability unit VIs–1; woodland suitability group 3c1.

CcE—Caneyville-Hagerstown rocky silt loams, 20 to 30 percent slopes. This complex is on side slopes of ridges. Each soil, along with outcroppings of rock, is randomly spaced throughout the areas.

Caneyville soils typically make up about 65 percent of the complex, but in some areas make up 45 to 80 percent; Hagerstown soils typically make up about 25 percent, but in some areas make up 15 to 40 percent; and outcrops of limestone typically make up about 10 percent but in some areas make up 5 to 15 percent. In some areas a few pieces of sandstone are on the surface, and the soil material is gravelly in spots.

Included with this complex in mapping were areas of an eroded soil that, if plowed and mixed, has a redder surface layer than the soil described as representative of either series. In places this layer contains more clay than the representative soil. Also included were areas of Faywood and Opequon soils.

The effective rooting depth is 20 to 40 inches in Caneyville soils and 40 to 60 inches or more in Hagerstown soils.

This complex is not suited to cultivated crops because of the hazard of erosion and the difficulty of operating equipment over and around the limestone outcrops and on the steep slopes. This complex is suited to the grasses and legumes commonly grown in the area, but it is better suited to plants that resist drought. It is also suited to trees. Capability unit VIs–1; woodland suitability group 3c2.

CdD—Caneyville-Shelocta rocky silt loams, 6 to 20 percent slopes. This complex is generally on the lower side slopes of ridges. Neither Caneyville or Shelocta soils are in a regular pattern; they are scattered at random throughout the area. The thickness of the loamy creep material over residuum weathered from limestone is the controlling factor in the development of either the Caneyville or Shelocta soils. This loamy creep material gravitated from higher elevations where the soils formed in residuum weathered from sandstone, siltstone, and shale. It was deposited as a mantle

Figure 8.—Pasture in a typical area of Caneyville-Hagerstown rocky silt loams, 6 to 20 percent slopes

on the residuum weathered from limestone. Thickness of this mantle ranges from slightly more than 0 to as much as 5 feet.

Caneyville soils typically make up about 55 percent of the complex, but in some areas make up 40 to 70 percent; Shelocta soils typically make up about 45 percent, but in some areas make up 30 to 60 percent; and outcrops of limestone typically make up about 3 percent and are scattered at random over the soil surface. Other coarse fragments on the surface and throughout the profile are 5 to 25 percent pebbles, as much as 5 percent coarse fragments that are 3 to 6 inches in diameter, and a few loose pieces of sandstone that are more than 10 inches in diameter.

Included with this complex in mapping were small areas of Rigley and Opequon soils.

The effective rooting depth is 20 to 40 inches in Caneyville soils and more than 48 inches in Shelocta soils.

This complex generally is not suited to cultivated crops because of the difficulty of operating equipment over or around the limestone outcrops. This complex is suited to the grasses and legumes commonly grown in the area. It is also suited to trees. Capability unit VIs–1; woodland suitability group 2c1.

CdE—Caneyville-Shelocta rocky silt loams, 20 to 30 percent slopes. This complex is generally on the lower side slopes of ridges. Neither the Caneyville or Shelocta soils are in a regular pattern; they are scattered at random throughout the area. The thickness of the loamy creep material over residuum weathered from limestone is the controlling factor in the development of either Caneyville or Shelocta soils. This loamy creep material gravitated from higher elevations where the soils formed in residuum weathered from sandstone, siltstone, and shale. It was deposited as a mantle over the residuum weathered from limestone. Thickness of this mantle ranges from slightly more than 0 to as much as 5 feet.

Caneyville soils typically make up about 55 percent of the complex, but in some areas make up 40 to 70 percent; Shelocta soils typically make up about 45 percent, but in some areas make up 30 to 60 percent; and outcrops of limestone typically make up about 3 percent and are scattered at random on the soil surface. Other coarse fragments on the surface and throughout the profile are 5 to 25 percent pebbles, as much as 5 percent coarse fragments that are 3 to 6 inches in diameter, and a few loose pieces of sandstone that are more than 10 inches in diameter.

Included with this complex in mapping were small areas of Rigley and Opequon soils. Also included were a few areas where slopes are as much as 40 percent.

The effective rooting depth is 20 to 40 inches in Caneyville soils and more than 48 inches in Shelocta soils.

This complex is not suited to cultivated crops because of the hazard of erosion and the difficulty of operating equipment over and around the rock outcrops and on the steep slopes. This complex is suited to the grasses and legumes commonly grown in the area, but it is better suited to plants that resist drought. It is also suited to trees. Capability unit VIs–1; woodland suitability group 3c2.

Chagrin Series

The Chagrin series consists of deep, well drained soils that formed in alluvium derived mainly from sandstone. Their formation was influenced by the material carried by runoff water from soils that formed in residuum weathered from limestone. These soils are mostly on flood plains of streams.

In a representative profile the surface layer is dark brown loam about 7 inches thick. The subsoil to a depth of 45 inches is dark yellowish brown, very friable loam. The substratum to a depth of 62 inches is dark yellowish brown, very friable gravelly fine sandy loam.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low.

Representative profile of Chagrin loam, about 1 mile south of Sand Springs on the west side of State Road 1249, about 5 miles south of Mount Vernon in Rockcastle County:

Ap—0 to 7 inches: dark brown (10YR 4/3) loam; weak fine granular structure; very friable; medium acid; abrupt smooth boundary.

B2—7 to 45 inches; dark yellowish brown (10YR 4/4) heavy loam; weak fine subangular blocky structure; very friable; 5 percent sandstone pebbles; medium acid; gradual wavy boundary.

C—45 to 62 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; massive; very friable; 25 percent sandstone pebbles; medium acid.

Thickness of the solum ranges from 36 to 48 inches. Depth to bedrock is more than 3½ feet. Soil material throughout the profile is medium acid to neutral. Pebbles make up 0 to 15 percent, by volume, of the solum and 0 to 30 percent, by volume, of the C horizon.

The Ap horizon is dark brown (10YR 4/3) or dark grayish brown (10YR 4/2). The B2 horizon ranges from dark brown (10YR 4/3) to yellowish brown (10YR 5/4). The C horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 3 or 4. It is loam or fine sandy loam or their gravelly analogues. In some profiles the soil material is stratified in the lower part.

Chagrin soils are near Nolin and Newark soils. Chagrin soils are more sandy throughout the profile than Nolin soils. They are more sandy in the A and B horizons and are better drained than Newark soils.

Cf—Chagrin loam (0 to 4 percent slopes). This soil is mostly on flood plains of streams.

Included with this soil in mapping were small areas of Nolin and Newark soils and areas where slopes are as much as 20 percent.

The effective rooting depth is more than 42 inches. Overflow is a hazard, especially late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but it is not suited to those that might be damaged by overflow. Capability unit I–2; woodland suitability group 1o1.

Colyer Variant

The Colyer variant consists of shallow, somewhat excessively drained soils that formed in residuum weathered from acid, black shale. These soils have a silty subsoil. They are on upland side slopes.

In a representative profile the surface layer is dark brown silt loam about 4 inches thick. The subsoil to a depth of 16 inches is dark yellowish brown, friable light silty clay loam. Black shale is at a depth of 16 inches.

Available water capacity is low to very low, and permeability is moderate. Natural fertility and organic matter content are low.

Representative profile of Colyer silt loam, silty subsoil variant, 12 to 20 percent slopes, about 800 feet east of Cupps Chapel Church on the north side of road, about 4 miles north of Brodhead in Rockcastle County:

Ap—0 to 4 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; 15 percent thin black shale fragments; strongly acid; clear smooth boundary.

B2—4 to 16 inches; dark yellowish brown (10YR 4/4) light silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; extremely acid; abrupt wavy boundary.

R—16 inches; black shale.

Thickness of the solum ranges from 6 to 20 inches. Depth to bedrock is 8 to 20 inches. The soil material throughout the profile is strongly acid, very strongly acid, or extremely acid, but in places the reaction of horizons at or near the surface has been altered by liming. Shale fragments make up 0 to 15 percent, by volume, of the A and B horizons and 0 to 35 percent, by volume, of the C horizon.

The Ap horizon is dark brown (10YR 4/3) or dark grayish brown (10YR 4/2). The B horizon is dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/8), or strong brown (7.5YR 5/6, 5/8). Where present, the C horizon is mottled, yellowish red (5YR 4/6), strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and light gray (10YR 7/2). It is silty clay loam or silty clay or their shaly analogues.

Colyer variant soils are near Tilsit and Stendal, terrace, soils. Colyer variant soils are much better drained and much shallower to bedrock than the moderately well drained Tilsit and somewhat poorly drained Stendal, terrace, soils.

ClD—Colyer silt loam, silty subsoil variant, 12 to 20

percent slopes. This soil is on side slopes. Included in mapping were areas of eroded soil that, if plowed and mixed, has a brighter colored surface layer than this soil. In places this layer contains more clay than the surface layer in this soil. Also included were areas where shale is in the surface layer.

The effective rooting depth is 8 to 20 inches. This soil is suited to grasses and legumes, but is better suited to plants that resist drought. Capability unit VIs–2; woodland suitability group 4d1.

Cotaco Series

The Cotaco series consists of deep, moderately well drained soils that formed in residuum weathered from sandstone or shale or in colluvium or alluvium derived from these materials. These soils are on upland ridgetops, stream terraces, toe slopes, and fans.

In a representative profile the surface layer is dark grayish brown loam about 8 inches thick. The subsoil to a depth of 18 inches is yellowish brown, friable loam, and between depths of 18 and 30 inches is yellowish brown, friable light clay loam that has strong brown and gray mottles. Below this, to a depth of 40 inches, the subsoil is mottled, gray, yellowish red, and strong brown, friable light clay loam. The substratum to a depth of 60 inches is mottled, light gray, strong brown, and yellowish brown, friable loam.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low. The depth to a seasonal water table ranges from 18 to 24 inches.

Representative profile of Cotaco loam on the east side of U.S. Highway 25, about 600 feet south of Fariston, which is about 4½ miles south of London in Laurel County:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable; slightly acid; clear smooth boundary.

B1—8 to 18 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; strongly acid; gradual wavy boundary.

B21t—18 to 30 inches; yellowish brown (10YR 5/4) light clay loam; common medium distinct strong brown (7.5YR 5/6) and gray (10YR 6/1) mottles; weak and moderate medium subangular blocky structure; friable; few thin clay films; very strongly acid; gradual wavy boundary.

B22t—30 to 40 inches; mottled gray (10YR 6/1), yellowish red (5Y 5/6), and strong brown (7.5YR 5/6) light clay loam; weak and moderate medium subangular blocky structure; friable; few thin clay films; very strongly acid; gradual wavy boundary.

C1—40 to 50 inches; mottled light gray (10YR 7/2), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/6) loam; massive; friable; very strongly acid; gradual wavy boundary.

C2g—50 to 60 inches; light gray (10YR 7/1) loam; few fine prominent yellowish brown (10YR 5/6) mottles; massive; friable; very strongly acid.

Thickness of the solum ranges from 30 to 42 inches. Depth to bedrock is more than 3½ feet. The soil material throughout the profile is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Gravel makes up 0 to 15 percent, by volume, of the material in the profile.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B1 horizon is dark yellowish brown (10YR 4/4) or yellowish brown (10YR 5/4, 5/6). The B2t horizon is yellowish brown (10YR 5/4, 5/6) and has strong brown (7.5YR 5/6) and gray (10YR 6/1) mottles, or it lacks a dominant color and is variegated yellowish red (5YR 5/6), strong brown (7.5YR 5/6), and gray (10YR 6/1). This horizon is loam, light clay loam, or sandy clay loam. The C horizon is gray or has gray, yellowish brown, and strong brown mottles. It is loam, light clay loam, or sandy clay loam.

Cotaco soils are near Lily, Allegheny, and Whitley, terrace, soils. Cotaco soils are not as well drained as Lily soils, but are deeper to bedrock than those soils. They are not as well drained as Allegheny soils. They have more sand in the A and B horizon than Whitley, terrace, soils and are not as well drained as those soils.

Co—Cotaco loam (1 to 6 percent slopes). This soil is on stream terraces, toe slopes, fans, and upland ridges.

Included with this soil in mapping were small areas of Lily, Allegheny, and Whitley, terrace, soils. Also included were a few areas where slopes are as much as 8 percent and a few areas where the surface layer is fine sandy loam.

The effective rooting depth is more than 42 inches. Overflow is a hazard in a few areas, especially late in winter or early in spring. The hazard of erosion is moderate in cultivated areas if slopes are more than 2 percent.

This soil is suited to all crops and pasture and hay plants commonly grown in the area, but alfalfa is sometimes damaged by wetness caused by the seasonal high water table. Capability unit IIe–4; woodland suitability group 2w1.

Crider Series

The Crider series consists of deep, well drained soils that formed in residuum weathered from limestone. These soils are on upland ridgetops and side slopes.

In a representative profile the surface layer is dark brown silt loam about 10 inches thick. The subsoil to a depth of 18 inches is dark brown, friable silty clay loam, and between depths of 18 and 43 inches is yellowish red, friable silty clay loam. Below this, to a depth of 65 inches, the subsoil is red, friable heavy silty clay loam that has very pale brown mottles.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low.

Representative profile of Crider silt loam, 2 to 6 per-

cent slopes, about 1.6 miles southwest of Roundstone School, which is about 7 miles north of Mount Vernon in Rockcastle County:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; medium acid; clear smooth boundary.

B21t—10 to 18 inches; dark brown (7.5YR 4/4) light silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; few thin clay films; strongly acid; gradual wavy boundary.

B22t—18 to 43 inches; yellowish red (5YR 4/6) light silty clay loam; moderate fine and medium subangular blocky structure; friable; few thin clay films; strongly acid; gradual wavy boundary.

IIB23t—43 to 65 inches; red (2.5YR 4/6) heavy silty clay loam; common medium distinct very pale brown (10YR 7/3) mottles; moderate fine and medium subangular blocky structure; friable; few thin clay films; 5 percent chert fragments; strongly acid.

Thickness of the solum ranges from 60 to 80 inches. Depth to bedrock is more than 5 feet. The soil material throughout the profile is strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming.

The Ap horizon is dark (10YR 4/3) or dark grayish brown (10YR 4/2). The B21t horizon is dark brown (7.5YR 4/4) or strong brown (7.5YR 5/6) silt loam or silty clay loam. The B22t horizon is yellowish red (5YR 4/6) or dark brown (7.5YR 4/4). The IIB23t horizon is red (2.5YR 4/6) or yellowish red (5YR 4/6) heavy silty clay loam or silty clay.

Crider soils are near Frederick, Caneyville, and Hagerstown soils. Crider soils are not as clayey in the upper part of the B horizon as Frederick, Caneyville, and Hagerstown soils. They are deeper to bedrock than Caneyville and Hagerstown soils and are not as rocky as those soils.

CsB—Crider silt loam, 2 to 6 percent slopes. This soil is on ridgetops and side slopes of ridges. Some areas have karst topography. This soil has the profile described as representative of the series.

Included with this soil in mapping were areas of a soil that is similar to Crider soils except the subsoil is yellowish brown and very strongly acid. Also included were areas of a soil that has a dark brown surface layer.

The effective rooting depth is more than 60 inches. The hazard of erosion is moderate in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. Capability unit IIe–2; woodland suitability group 1o2.

CsC—Crider silt loam, 6 to 12 percent slopes. This soil is on ridgetops and side slopes. Some areas have karst topography.

Included with this soil in mapping were areas of a soil that is similar to Crider soils except the subsoil is yellowish brown and very strongly acid. Also included were small areas of Frederick soils and areas of eroded soils that, if plowed and mixed, have more clay in the surface layer than the soil described as representative of the Crider series.

The effective rooting depth is more than 60 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. Capability unit IIIe–2; woodland suitability group 1o2.

Cuba Series

The Cuba series consists of deep, well drained soils that formed in alluvium derived from soils on uplands underlain by sandstone, siltstone, and shale. These soils are on flood plains of streams.

In a representative profile the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of 40 inches is dark yellowish brown, friable silt loam. The substratum to a depth of 60 inches is mottled, yellowish brown, dark brown, and light brownish gray, friable silt loam.

Available water capacity is high, and permeability is moderate. National fertility is high, and organic-matter content is low.

Representative profile of Cuba silt loam, about 300 feet northeast of McWhorter Post Office on State Route 638, about 10 miles northeast of London in Laurel County:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

B1—8 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable; strongly acid; gradual wavy boundary.

B2—18 to 40 inches; dark yellowish brown (10YR 4/4) heavy silt loam; weak fine granular structure; friable; very strongly acid; gradual wavy boundary.

C—40 to 60 inches; mottled yellowish brown (10YR 5/4), dark brown (10YR 3/3), and light brownish gray (10YR 6/2) silt loam; massive; friable; very strongly acid.

Thickness of the solum ranges from 24 to 40 inches. Depth to bedrock is more than 5 feet. The soil material throughout the profile is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming.

The Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). The B horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 3 to 6. The C horizon has dominant colors in a hue of 10YR, a value of 3 to 6, and a chroma of 3 to 6. In some profiles it does not have gray mottles. The C horizon is silt loam in most profiles, but it is loam or fine sandy loam in the lower part of some profiles.

Cuba soils are near Pope, Steff, Stendal, and Bonnie soils. Cuba soils have less sand throughout the profile than Pope soils. They are better drained than the moderately well drained Steff soils, somewhat poorly drained Stendal soils, and poorly drained Bonnie soils.

Cu—Cuba silt loam (0 to 2 percent slopes). This soil is on flood plains of streams. Included in mapping were small areas of Pope, Steff, and Stendal soils. Also

included were areas of soils that are as shallow as 3 feet to bedrock.

The effective rooting depth is generally more than 60 inches, but it is restricted in places by a seasonal water table at a depth as shallow as 48 inches. Overflow is a hazard, especially late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but is not suited to those that might be damaged by overflow. Capability unit I–1; woodland suitability group 1o1.

Donahue Series

The Donahue series consists of moderately deep, well drained soils that formed partly in colluvium derived mostly from sandstone and partly in the underlying residuum weathered from limestone. These soils are on side slopes.

In a representative profile the surface layer is mostly yellowish brown sandy loam about 6 inches thick. The subsoil to a depth of 12 inches is light yellowish brown, very friable sandy loam, and to a depth of 18 inches is yellowish brown, friable loam. Below this the subsoil is strong brown, friable loam to a depth of 22 inches and yellowish red, firm clay to a depth of 35 inches. The substratum to a depth of 38 inches is yellowish brown, very firm clay that has light reddish brown mottles. Limestone bedrock is at a depth of 38 inches.

Available water capacity is moderate, and permeability is moderately slow. Natural fertility is medium, and organic-matter content is low.

Representative profile of Donahue rocky sandy loam, 40 to 75 percent slopes, about 2 miles southeast of Hummel, which is about 5 miles northeast of Mount Vernon in Rockcastle County:

O11—1½ inches to 0; undecomposed needles and leaves.

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) sandy loam; weak medium granular structure; very friable; 12 percent coarse fragments; many roots; very strongly acid; abrupt smooth boundary.

A2—1 inch to 6 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse granular structure; very friable; 12 percent coarse fragments; many roots; very strongly acid; clear wavy boundary.

B1—6 to 12 inches; light yellowish brown (10YR 6/4) heavy sandy loam; weak fine subangular blocky structure; very friable; 20 percent coarse fragments; common roots; strongly acid; clear wavy boundary.

B21t—12 to 18 inches; yellowish brown (10YR 5/6) heavy loam; weak fine subangular blocky structure; friable; faint patchy clay films on peds; 12 percent coarse fragments; few roots; strongly acid; clear wavy boundary.

B22t—18 to 22 inches; strong brown (7.5YR 5/6) heavy loam; weak very fine subangular blocky structure; friable; faint patchy clay films on peds; 12 percent coarse fragments; few roots; strongly acid; clear wavy boundary.

IIB23t—22 to 35 inches; yellowish red (5YR 5/8) clay; moderate fine subangular blocky structure; firm; distinct complete clay films on peds; 5 percent coarse fragments; few roots; neutral; gradual wavy boundary.

C—35 to 38 inches; yellowish brown (10YR 5/6) clay; common coarse prominent light reddish brown (5YR 6/3) mottles; massive; very firm; 1 percent coarse fragments; few roots; neutral; abrupt smooth boundary.

R—38 inches; limestone bedrock.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Thickness of the loamy colluvium over clayey residuum ranges from 16 to 24 inches. The material in the upper part of the profile is strongly acid to very strongly acid; that in the lower part is medium acid to neutral. Coarse fragments make up 0 to 30 percent, by volume, of the material in the profile.

The A1 horizon is very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2). The B21t and B22t horizons are yellowish brown (10YR 5/4, 5/6) or strong brown (7.5YR 5/6) loam, sandy clay loam, or light clay loam or their channery analogs. The IIBt horizon has a hue of 5YR or 7.5YR, a value of 4 or 5, and a chroma of 4 to 8. Some profiles do not have a C horizon.

Donahue soils are near Caneyville and Shelocta soils. Donahue soils have more sand in the upper part of the B horizon than those soils.

DoF—Donahue rocky sandy loam, 40 to 75 percent slopes. This soil is on side slopes. Limestone crops out at random on 3 to 15 percent of the surface, but the average total outcroppings make up about 10 percent of the surface area. Limestone cliffs are in some areas of this soil.

Included with this soil in mapping were areas of Rigley, Caneyville, and Shelocta soils. Also included were areas of soils that have slopes of as little as 20 percent and areas of soils that have a surface layer of loam.

The effective rooting depth of this soil is 20 to 40 inches. The soil is poorly suited to uses other than woodland or wildlife habitat because it is so steep and rocky. Capability unit VIIe–1; woodland suitability group 2x1 on north- and east-facing slopes and 3x1 on south- and west-facing slopes.

Faywood Series

The Faywood series consists of moderately deep, well drained soils that formed in residuum weathered from limestone and shale. These soils are on upland side slopes.

In a representative profile the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsoil to a depth of 14 inches is dark brown, firm silty clay and to a depth of 20 inches is dark yellowish brown, firm silty clay. The substratum to a depth of 33 inches is light olive brown, firm, silty clay. Limestone bedrock is at a depth of 33 inches.

Available water capacity is moderate, and permeability is moderately slow. Natural fertility is medium, and organic matter content is low.

Representative profile of Faywood silt loam in an area of Brookside-Faywood-Rock outcrop complex, 30 to 65 percent slopes, about 1 mile north of Hummel, which is about 2.5 miles northeast of Mount Vernon in Rockcastle County:

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable; many roots; neutral; clear wavy boundary.

B21t—4 to 14 inches; dark brown (7.5YR 4/4) silty clay; moderate medium angular blocky structure; firm; few continuous clay films; neutral; gradual wavy boundary.

B22t—14 to 20 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium angular blocky structure; firm; few continuous clay films; neutral; gradual wavy boundary.

C—20 to 33 inches; light olive brown (2.5Y 5/4) silty clay; massive; firm; neutral; abrupt wavy boundary.

R—33 inches; limestone bedrock.

Thickness of the solum ranges from 18 to 35 inches. Depth to bedrock is 20 to 40 inches. The soil material throughout the profile is medium acid to neutral. Coarse fragments smaller than stone size make up 0 to 15 percent, by volume, of the solum.

The A1 horizon has a hue of 10YR, a value of 3 or 4, and a chroma of 2 or 3. The Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). The B2t horizon has a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 4 or 6. It is silty clay or clay. The C horizon is olive or brown silty clay or clay. In some profiles the C horizon has mottles in shades of red, gray, or both.

Faywood soils are near Brookside, Opequon, Caneyville, and Shelocta soils. Faywood soils are not nearly as deep to bedrock as Brookside soils, but they are deeper to bedrock than Opequon soils. They are not as acid or as red in the B horizon as Caneyville soils. They are much shallower to bedrock and much more clayey in the B horizon than Shelocta soils and are not nearly as acid as those soils.

FcD—Faywood-Opequon-Rock outcrop complex, 12 to 30 percent slopes. This complex is on the side slopes of ridges. Soils of each series (Faywood and Opequon), as well as the bedrock Rock outcrop, are randomly spaced throughout the areas.

Faywood soils typically make up about 50 percent of the complex, the Opequon soil about 25 percent, and Rock outcrop about 25 percent. The Faywood soils have a surface layer of silt loam. The Opequon soil has the profile described as representative of its series. It has a surface layer of silty clay loam.

Included with this complex in mapping were areas of Caneyville, Hagerstown, and Shelocta soils. Also included were areas of soils that are less than 12 inches deep to bedrock.

The effective rooting depth is 20 to 40 inches in Faywood soils and 12 to 20 inches in the Opequon soil.

This complex, because it is so rocky in most places, is poorly suited to uses other than woodland or wildlife habitat. Most areas are wooded. Capability unit VIIs–2; woodland suitability group 2x1 on north- and east-facing slopes and 3x1 on south- and west-facing slopes.

Frederick Series

The Frederick series consists of deep, well drained soils that formed in residuum weathered from limestone and some sandstone. These soils are on upland ridge tops and side slopes.

In a representative profile the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of 12 inches is yellowish red, friable silty clay loam and, to a depth of 75 inches, is red, firm silty clay.

Available water capacity is high, and permeability is moderate in these soils.

Representative profile of Frederick silt loam, 6 to 12 percent slopes, about 1.5 miles north of Union Chapel Church, which is about 5 miles northwest of Mount Vernon in Rockcastle County:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; 2 percent chert fragments; medium acid; clear smooth boundary.

B1t—8 to 12 inches; yellowish red (5YR 4/6) light silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; few thin clay films; 2 percent chert fragments; medium acid; gradual wavy boundary.

B21t—12 to 36 inches; red (2.5YR 4/6) silty clay; strong fine and medium angular blocky structure; firm, sticky and plastic when wet; thin clay films; 5 percent chert fragments; very strongly acid; gradual wavy boundary.

B22t—36 to 75 inches; red (2.5YR 4/6) silty clay; common medium prominent yellowish brown (10YR 5/4) mottles; strong fine and medium angular blocky structure; firm, sticky and plastic when wet; thin clay films; 5 percent chert fragments; very strongly acid.

Thickness of the solum ranges from 60 to 100 inches. Depth to bedrock is more than 6 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Chert fragments make up 1 to 5 percent, by volume, of the profile.

The Ap horizon commonly has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3, but in areas of eroded soil color and texture are similar to those in the B1 horizon. The B1 horizon is commonly yellowish red (5YR 4/6) light or heavy silty clay loam, but in some profiles it is strong brown (7.5YR 5/6). The B2t horizon has dominant colors in a hue of 5YR or 2.5YR, a value of 4, and a chroma of 6 or 8. It is heavy silty clay loam, silty clay, or clay. This horizon has few to many yellowish brown mottles that increase in number with increasing depth.

Frederick soils are near Crider, Bedford, Caneyville, and Hagerstown soils. Frederick soils have more clay in the B21 and B22 horizons than Crider soils. They are better drained than Bedford soils and lack the fragipan

of those soils. They have thicker A and B horizons than Caneyville and Hagerstown soils.

FdB—Frederick silt loam, 2 to 6 percent slopes. This soil is on ridgetops and side slopes. Some areas have karst topography.

Included with this soil in mapping were small areas of Crider and Bedford soils. Also included were small areas where soils have a subsoil that is more than 15 percent chert fragments.

The effective rooting depth is more than 60 inches. Natural fertility is medium, and organic matter content is low. The hazard of erosion is moderate in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. It is used mostly for corn, hay, and pasture. Capability unit IIe–2; woodland suitability group 2c1.

FdC—Frederick silt loam, 6 to 12 percent slopes. This soil is mostly on side slopes. Some areas have karst topography. This soil has the profile described as representative of the series.

Included with this soil in mapping were areas of an eroded soil that, if plowed and mixed, has a redder surface layer than this soil. In places this surface layer contains more clay than the one in this soil. Also included were small areas of Crider, Caneyville, and Hagerstown soils and areas of a soil that is more than 15 percent chert fragments throughout the profile.

The effective rooting depth is more than 60 inches. Natural fertility is medium, and organic matter content is low. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. It is used mostly for corn, hay, and pasture. Capability unit IIIe–2; woodland suitability group 2c1.

FdD—Frederick silt loam, 12 to 20 percent slopes. This soil is mostly on side slopes. Some areas have karst topography.

Included with this soil in mapping were areas of eroded soils that, if plowed and mixed, have a redder surface layer than this soil. In places this layer contains more clay than the surface layer of the soil that is representative of the series. Also included were small areas of Caneyville and Hagerstown soils and areas of a soil that is more than 15 percent chert fragments throughout the profile.

The effective rooting depth is more than 60 inches. Natural fertility is medium, and organic-matter content is low. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to hay and pasture than to cultivated crops, but it is suited to occasional cultivation. It is suited to all grasses and legumes commonly grown in the area. Capability unit IVe–2; woodland suitability group 2c1.

FhD3—Frederick silty clay loam, 12 to 20 percent slopes, severely eroded. This soil is mostly on side slopes. Some areas have karst topography. The original surface layer was removed by erosion, and the present surface layer is made up of material from the subsoil. Thus, this soil has a profile similar to the one described as representative of the series, but the surface layer is redder and has a higher clay content.

Included with this soil in mapping were areas of only slightly eroded soils. Also included were small areas of Caneyville and Hagerstown soils and areas of a soil that is more than 15 percent chert fragments throughout the profile.

The effective rooting depth is more than 60 inches. Natural fertility and organic matter content are low.

Because of the hazard of additional erosion, this soil is not suited to cultivation. It is better suited to grasses and legumes that resist drought. Capability unit VIe–1; woodland suitability group 3c1.

Hagerstown Series

The Hagerstown series consists of deep, well drained soils that formed in residuum weathered from limestone. These soils are on upland side slopes.

In a representative profile the surface layer is dark brown silt loam about 6 inches thick. The subsoil to a depth of 9 inches is yellowish red, friable light silty clay loam. Between depths of 9 and 22 inches, it is yellowish red, firm silty clay; and between depths of 22 and 40 inches, it is red, firm clay that has yellowish brown mottles. Below this, to a depth of 53 inches, the subsoil is yellowish red, very firm clay that has gray mottles. Limestone bedrock is at a depth of 53 inches.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low.

Representative profile of Hagerstown silt loam in an area of Caneyville-Hagerstown rocky silt loams, 6 to 20 percent slopes, 3/4 mile southwest of Marketburg, which is about 3 miles west of Mount Vernon in Rockcastle County:

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; slightly acid; clear smooth boundary.

B1—6 to 9 inches; yellowish red (5YR 4/6) light silty clay loam; moderate fine and medium subangular blocky structure; friable; slightly acid; gradual wavy boundary.

B21t—9 to 22 inches; yellowish red (5YR 4/6) silty clay; moderate medium angular blocky structure; firm; 2 percent chert fragments; few small black concretions; few thin clay films; slightly acid; gradual wavy boundary.

B22t—22 to 40 inches; red (2.5YR 4/6) clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; thin clay films; strongly acid; gradual wavy boundary.

B23t—40 to 53 inches; yellowish red (5YR 4/6) clay; few fine distinct gray (N 6/0) mottles; strong coarse angular blocky structure; very firm; thin clay films; strongly acid.

R—53 inches; limestone bedrock.

Thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is 40 to 60 inches or more. The soil material throughout the profile is slightly acid to strongly acid.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 3 or 4. The B1 horizon has a hue of 5YR or 7.5YR, a value of 4 or 5, and a chroma of 4 or 6.

It is silty clay loam or silty clay. The B2t horizon has dominant colors in a hue of 5YR or 2.5YR, a value of 4, and a chroma of 4 or 6. Texture is silty clay or clay. Some profiles have brown mottles in the lower part of the B2t horizon. Some profiles have a clayey C horizon that has matrix colors and mottles in shades of gray, brown, yellow, or red.

Hagerstown soils are near Caneyville, Frederick, Faywood, and Opequon soils. Hagerstown soils are deeper to bedrock than Caneyville, Faywood, and Opequon soils. They are generally not as deep to bedrock as Frederick soils.

Jefferson Series

The Jefferson series consists of deep, well drained soils. They formed mainly in loamy colluvium derived from upland soils underlain mostly by sandstone, siltstone, and shale. These soils are on upland side slopes and colluvial toe slopes.

In a representative profile the surface layer is about 8 inches thick. The upper 2 inches is dark brown fine sandy loam, and the lower 6 inches is yellowish brown fine sandy loam. The subsoil to a depth of 17 inches is pale brown, very friable fine sandy loam; and between depths of 17 and 33 inches it is strong brown, friable loam. Between depths of 33 and 43 inches, the subsoil is yellowish brown, friable channery loam; between depths of 43 and 58 inches, it is yellowish brown, friable channery loam that has light yellowish brown mottles. The substratum to a depth of 70 inches is strong brown, firm clay that has light brownish gray and red mottles.

Available water capacity is moderate, and permeability is moderately rapid. Natural fertility is medium, and organic matter content is low.

Representative profile of Jefferson fine sandy loam in an area of Jefferson-Latham complex, 25 to 40 percent slopes, about 6 miles west of Cold Hill, ¼ mile north of Forest Service Road 119, at the head of Spruce Branch in Laurel County:

O1—2¼ to ¾ inch; mixed hardwood leaves and twigs.

O2—¾ inch to 0; black organic matter.

A1—0 to 2 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; loose; 10 percent coarse fragments; many roots; very strongly acid; abrupt smooth boundary.

A2—2 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; 10 percent coarse fragments; many roots; very strongly acid; clear smooth boundary.

B1—8 to 17 inches; pale brown (10YR 6/3) fine sandy loam; weak fine subangular blocky structure; very friable; 10 percent coarse fragments; common roots; very strongly acid; clear wavy boundary.

B2t—17 to 33 inches; strong brown (7.5YR 5/6) heavy loam; moderate fine subangular blocky structure; friable; distinct broken clay films on peds; 10 percent coarse fragments; few roots; very strongly acid; clear wavy boundary.

B31t—33 to 43 inches; yellowish brown (10YR 5/6) channery heavy loam; weak medium subangular blocky structure; friable; faint patchy clay films on peds; 25 percent coarse fragments; few roots; very strongly acid; gradual wavy boundary.

B32t—43 to 58 inches; yellowish brown (10YR 5/6) channery heavy loam; common coarse faint light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; friable; faint patchy clay films on peds; 20 percent coarse fragments; few roots; very strongly acid; abrupt wavy boundary.

IIC—58 to 70 inches; strong brown (7.5YR 5/6) clay; many fine prominent light brownish gray (2.5Y 6/2) and red (2.5Y 5/8) mottles; massive or weak relict platy structure; firm; partly weathered shale; very strongly acid.

Thickness of the solum ranges from 43 to 60 inches. Depth to bedrock is more than 4 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places reaction of horizons at or near the surface has been altered by liming. Coarse fragments ranging from 1 to 15 inches in diameter make up 10 to 25 percent of the solum and 0 to 30 percent of the C horizon.

The A1 horizon has a hue of 10YR, a value of 3 to 5, and a chroma of 2 or 3. The fine earth fraction is loam or fine sandy loam. The A2 horizon has a hue of 10YR, a value of 5 or 6, and a chroma of 3 or 4. The fine earth fraction is loam or fine sandy loam. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The fine earth fraction is loam or fine sandy loam. The B1 horizon has a hue of 10YR, a value of 5 or 6, and a chroma of 3 to 6. The fine earth fraction is loam or fine sandy loam. The Bt horizon is yellowish brown (10YR 5/4, 5/6) or strong brown (7.5YR 5/6). The fine earth fraction is heavy loam, sandy clay loam, or light clay loam. This horizon has mottles in shades of brown and yellow in some profiles. The C horizon is clayey or loamy.

Jefferson soils are near Latham soils. Jefferson soils are deeper than Latham soils and are not nearly as clayey in the B horizon as those soils.

JlF—Jefferson-Latham complex, 25 to 40 percent slopes. This complex is mainly on side slopes. The Jefferson soil is mostly on lower side slopes, on toe slopes, and in coves, but it is present wherever colluvium has accumulated. Latham soils are mostly on convex noses and benches. The Jefferson soil has the profile described as representative of the series. The surface layer is loam or fine sandy loam. The Latham soils have a surface layer of silt loam. Loose pieces of sandstone are randomly spaced on about 1 or 2 percent of the surface of the soils in this complex, and in many places a sandstone cliff is above the Jefferson soil.

The Jefferson soil typically makes up about 70 percent of the complex, but in some areas it makes up 50 to 80 percent; Latham soils typically make up about 30 percent, but in some areas they make up 20 to 50 percent.

Included with this complex in mapping were areas of Shelocta and Rigley soils. Included in the coves of

north-facing slopes were areas of a soil that is similar to the Jefferson soil, but it has a very dark gray surface layer. Also included were areas of soils that have as much as 5 percent of the surface covered with loose pieces of sandstone.

The effective rooting depth is more than 48 inches in Jefferson soil and 20 to 40 inches in Latham soils.

Even if properly managed, this complex has limited use for pasture because it is so steep. This complex is well suited to woodland and wildlife habitat. Capability unit VIIe–1; woodland suitability group 1r1 on north- and east-facing slopes and 2r1 on south- and west-facing slopes.

Latham Series

The Latham series consists of moderately deep, moderately well drained soils that formed in residuum weathered mainly from acid shale but in places weathered partly from sandstone or siltstone or both. These soils are on upland ridgetops and side slopes.

In a representative profile the surface layer is dark brown silt loam about 6 inches thick. The subsoil to a depth of 26 inches is strong brown, very firm silty clay and, to a depth of 34 inches, is strong brown, very firm silty clay that has light gray mottles. The substratum to a depth of 96 inches is brown, red, and gray soft clay shale.

Available water capacity is moderate, and permeability is slow in these soils.

Representative profile of Latham silt loam, 12 to 20 percent slopes, about 3,400 feet southeast of the junction of State Road 229 and Little Robinson Creek, which is about 10 miles southeast of London in Laurel County:

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; medium acid; clear smooth boundary.

B2t—6 to 26 inches; strong brown (7.5YR 5/6) silty clay; moderate fine and medium subangular blocky structure; very firm; few thin clay films; very strongly acid; gradual wavy boundary.

B3t—26 to 34 inches; strong brown (7.5YR 5/6) silty clay; few fine distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; very firm; thin clay films; 10 percent shale fragments; very strongly acid; gradual wavy boundary.

C—34 to 96 inches; brown, red, and gray soft clay shale; relict platy structure.

Thickness of the solum ranges from 20 to 40 inches. Depth to soft shale is 20 to 40 inches, and depth to hard shale is more than 48 inches. The soil material throughout the profile is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Shale fragments make up 0 to 15 percent, by volume, of the solum and as much as 90 percent, by volume, of the C horizon.

The Ap horizon commonly has a hue of 10YR, a value of 4 to 5, and a chroma of 2 or 3, but in areas of eroded soils it is dark yellowish brown (10YR 4/4). It is commonly silt loam, but it is silty clay loam in eroded soil. Some profiles have a B1 horizon of yellowish brown (10YR 5/6) silt loam or light silty clay loam. The B2t horizon has a hue of 10YR or 7.5Y, a value of 5, and a chroma of 4 to 8. It is heavy silty clay loam, silty clay, or clay. In some areas this horizon has mottles in a hue of 10YR, 7.5YR, or 5YR; a value of 5 or 6; and a chroma of 4 to 8. Profiles that do not have a B3t horizon have mottles in the lower part of the B2t horizon or the upper part of the C horizon. These mottles have a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The B3t horizon has the same color range as the B2t horizon, but it does not have mottles that have a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The C horizon has matrix colors and mottles in shades of brown, yellow, red, olive, and gray. It is heavy silty clay loam, silty clay, or clay or their shaly or very shaly analogues.

Latham soils are near Whitley, Lily, Shelocta, Weikert, and Jefferson soils. Latham soils are much more clayey in the B horizon than Whitley and Shelocta soils. They are much more clayey throughout the profile than Lily soils. Latham soils are deeper and more clayey in the B horizon than Weikert soils. They are not as deep as Jefferson soils and are much more clayey in the B horizon than those soils.

LbB—Latham silt loam, 2 to 6 percent slopes. This soil is on ridgetops.

Included with this soil in mapping were a few areas of Whitley and Lily soils.

The effective rooting depth is 20 to 40 inches. Natural fertility is medium, and organic matter content is low. The hazard of erosion is moderate in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. It is used mostly for corn, hay, and pasture. Capability unit IIe–3; woodland suitability group 3c1.

LbC—Latham silt loam, 6 to 12 percent slopes. This soil is mostly on side slopes.

Included with this soil in mapping were areas of Whitley and Lily soils and areas of eroded soils that, if plowed and mixed, have a redder surface layer than this soil. In places this layer contains more clay than the one in the soil that is representative of the series. Also included were areas of a soil that is similar to Latham soils but has a redder subsoil.

The effective rooting depth is 20 to 40 inches. Natural fertility is medium, and organic matter content is low. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. It is used mostly for corn, hay, and pasture. Capability unit IIIe–3; woodland suitability group 3c1.

LbD—Latham silt loam, 12 to 20 percent slopes. This soil is mostly on side slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Whitley and Lily soils and areas of an eroded soil that, if plowed and mixed, has a redder surface layer than this soil. In places this layer contains more clay than this soil. Also included were areas of a soil that is similar to Latham soils but has a redder subsoil.

The effective rooting depth is 20 to 40 inches. Natural fertility is medium, and organic matter content is low. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to

cultivated crops, but it is suited to occasional cultivation. It is suited to all grasses and legumes commonly grown in the area. Capability unit IVe–1; woodland suitability group 3c1.

LdD3—Latham silty clay loam, 12 to 20 percent slopes, severely eroded. This soil is mostly on side slopes. It has a profile similar to the one described as representative of the series, but the surface layer is redder and has a higher clay content. This difference has resulted because the original surface layer was removed by erosion, and the subsoil is now part of the plow layer.

Included with this soil in mapping were areas of only slightly eroded soils, areas of Whitley and Lily soils, and areas of a soil that is similar to Latham soils but has a redder subsoil. Also included were a few areas where slopes are as much as 30 percent.

The effective rooting depth is 20 to 40 inches. Natural fertility and organic matter content are low.

Because of the hazard of additional erosion, this soil is not suited to cultivation. It is better suited to grasses and legumes that resist drought. It is well suited to trees. Capability unit VIe–1; woodland suitability group 4c1.

LhD—Latham-Lily complex, 6 to 20 percent slopes. This complex is on ridgetops.

Latham soils typically make up about 45 percent of the complex, but in some areas they make up 35 to 55 percent. Lily soils typically make up about 35 percent but in some areas they make up 25 to 45 percent. Whitley and Steinsburg soils make up the rest of the complex. Latham soils have a surface layer of silt loam, and Lily soils have a surface layer of loam.

The effective rooting depth is 20 to 40 inches in Latham and Lily soils. The hazard of erosion is severe to very severe in cultivated areas.

This complex is better suited to pasture or hay than to cultivated crops, but it is suited to occasional cultivation. Most areas of the complex are wooded. Capability unit IVe–1; woodland suitability group 3c1.

Lily Series

The Lily series consists of moderately deep, well drained soils that formed in residuum weathered from sandstone. These soils are on ridgetops and side slopes.

In a representative profile the surface layer is brown loam about 8 inches thick. The subsoil to a depth of 24 inches is strong brown, friable light clay loam, and to a depth of 30 inches, is strong brown, firm sandy clay loam that has red mottles. Sandstone bedrock is at a depth of 30 inches.

Available water capacity is moderate, and permeability is moderately rapid. Natural fertility is medium, and organic matter content is low.

Representative profile of Lily loam, 2 to 6 percent slopes, on the south side of State Road 229, about 7/8 mile northwest of Tuttle, which is about 12 miles southeast of London in Laurel County:

Ap—0 to 8 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; slightly acid; clear smooth boundary.

B21t—8 to 24 inches; strong brown (7.5YR 5/6) light clay loam; moderate fine and medium subangular blocky structure; friable; many clay films; extremely acid; gradual smooth boundary.

B22t—24 to 30 inches; strong brown (7.5YR 5/6) sandy clay loam; common fine distinct red (2.5YR 4/6) mottles; moderate medium angular blocky structure; firm; common clay films; extremely acid; abrupt smooth boundary.

R—30 inches; red and yellow soft sandstone.

Thickness of the solum and depth to bedrock are 20 to 40 inches. Throughout the profile the soil material is strongly acid, very strongly acid, or extremely acid, but in places the reaction of horizons at or near the surface has been altered by liming.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. It is loam or fine sandy loam. Some profiles have a B1 horizon that is yellowish brown (10YR 5/4, 5/6) loam. The Bt horizon is yellowish brown (10YR 5/4, 5/6, 5/8) or strong brown (7.5YR 5/6, 5/8) sandy clay loam or light clay loam. Mottles are red or yellow, or some profiles lack mottles. Some profiles have a C horizon that is yellow, brown, or red loam, sandy loam, sandy clay loam, or clay loam.

Lily soils are near Whitley, Latham, and Steinsburg soils. Lily soils are not as deep to bedrock as Whitley soils, and they have more sand in the solum than those soils. Lily soils have much more sand in the solum than Latham soils. They have more clay in the B horizon than Steinsburg soils.

LlB—Lily loam, 2 to 6 percent slopes. This soil is on ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Whitley and Latham soils. Also included were areas of soils that contain more sand in the surface layer than this soil.

The effective rooting depth is 20 to 40 inches. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but it is used mostly for hay and pasture. Capability unit IIe–5; woodland suitability group 2o1.

LlC—Lily loam, 6 to 12 percent slopes. This soil is on ridgetops and side slopes.

Included with this soil in mapping were small areas of Whitley, Latham, and Steinsburg soils. Also included, on ridgetops, were some soils that have slopes of less than 6 percent.

The effective rooting depth is 20 to 40 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but it is used mostly for hay and pasture. Capability unit IIIe–5; woodland suitability group 2o1.

LsD—Lily fine sandy loam, 12 to 20 percent slopes. This soil is on side slopes. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam.

Included with this soil in mapping were small areas of Latham, Whitley, and Steinsburg soils. Also included were some areas that have a few stones and outcroppings of rock and a few areas where the soil is gravelly or channery or both.

The effective rooting depth is 20 to 40 inches. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture or hay than to cultivated crops, but it is suited to occasional cultivation. It is suited to most of the commonly grown grasses and legumes, but some plants require intensive fertilization. Capability unit IVe–1; woodland suitability group 2o1.

LtE—Lily and Steinsburg fine sandy loams, 20 to 30 percent slopes. These soils are on side slopes. Lily soils have a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam. In some areas Lily and Steinsburg soils are intermixed, and other areas consist almost entirely of Lily or Steinsburg soils.

Included with this unit in mapping were small areas of Latham and Rigley soils. Also included were a few areas of a deep silty soil and a few areas that are gravelly, channery, or stony or a combination of these three.

The effective rooting depth is 20 to 40 inches. It is difficult to operate farm equipment on the steep slopes. The hazard of erosion makes these soils unsuited to cultivation.

This unit is suited to most grasses and legumes commonly grown in the area, but some plants require intensive fertilization. Capability unit VIe–2; woodland suitability group 3r1.

Lindside Series

The Lindside series consists of deep, moderately well drained soils that formed in alluvium derived from upland soils underlain mainly by limestone. In places, however, the upland soils are underlain partly by sandstone. The Lindside soils are on flood plains and in depressions.

In a representative profile the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of 16 inches is dark brown, very friable silt loam, and to a depth of 36 inches is dark brown, very friable silt loam that has gray mottles. The substratum to a depth of 60 inches is grayish brown, very friable silt loam that has dark brown mottles.

Available water capacity is high, and permeability is moderate. Natural fertility is high, and organic matter content is low. The depth to a seasonal high water table ranges from 18 to 24 inches.

Representative profile of Lindside silt loam, about ½ mile northeast of Gum Sulphur, which is about 3 miles northwest of Brodhead in Rockcastle County:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; neutral; gradual wavy boundary.

B1—8 to 16 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; medium acid; gradual wavy boundary.

B2—16 to 36 inches; dark brown (10YR 4/3) silt loam; common fine distinct gray (10YR 6/1) mottles; weak fine granular structure; very friable; medium acid; gradual wavy boundary.

Cg—36 to 60 inches; grayish brown (10YR 5/2) silt loam; many fine distinct dark brown (10YR 4/3) mottles; massive; very friable; medium acid.

Thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is medium acid or slightly acid, but in places the reaction of horizons at or near the surface has been altered by liming. In a few profiles small pieces of chert fragments make up as much as 5 percent, by volume, of any horizon.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The color of the B horizon is similar to that of the Ap horizon, but the chroma is 3 or 4 and the lower part of the horizon has mottles in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The C horizon has a hue of 10YR, a value of 5 or 6, and a chroma of 2 or 3. It is silt loam or loam.

Lindside soils are near Nolin and Newark soils. Lindside soils are not as well drained as Nolin soils, but they are better drained than Newark soils.

Lv—Lindside silt loam (0 to 2 percent slopes). This soil is on flood plains and in depressions. Included in mapping were small areas of Nolin and Newark soils.

The effective rooting depth is more than 48 inches. Overflow is a hazard, especially late in winter or early in spring. This soil is moderately well drained, and artificial drainage improves plant growth during wet seasons.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but is not suited to those that might be damaged by overflow. Capability unit I–3; woodland suitability group 1w1.

Morehead Series

The Morehead series consists of deep, moderately well drained soils that formed in alluvium or colluvium derived mainly from upland soils underlain by sandstone, siltstone, and shale. These soils are mostly on stream terraces and toe slopes.

In a representative profile the surface layer is brown silt loam about 8 inches thick. The subsoil is yellowish brown, friable heavy silt loam to a depth of 20 inches; yellowish brown, friable light silty clay loam that has light brownish gray and strong brown mottles between depths of 20 and 30 inches; and mottled, light brownish gray and yellowish brown, friable heavy silt loam between depths of 30 and 43 inches. The substratum to a depth of 60 inches is mottled, light brownish gray and yellowish brown, friable silt loam.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 18 to 24 inches.

Representative profile of Morehead silt loam, about 450 feet west of the junction of State Road 229 and the Louisville & Nashville Railroad, which is about 2 miles east of London in Laurel County:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; mildly alkaline; clear smooth boundary.

B1—8 to 20 inches; yellowish brown (10YR 5/6) heavy silt loam; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

B21t—20 to 30 inches; yellowish brown (10YR 5/6) light silty clay loam; common me-

dium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few clay films; very strongly acid; gradual wavy boundary.

B22t—30 to 43 inches; mottled light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) heavy silt loam; weak fine and medium subangular blocky structure; friable; few thin discontinuous clay films; few dark brown concretions; very strongly acid; gradual wavy boundary.

C—43 to 60 inches; mottled light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) silt loam; massive; friable; very strongly acid.

Thickness of the solum ranges from 40 to 50 inches. Depth to bedrock is more than 4 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B1 horizon has a hue of 10YR or 2.5Y, a value of 5 or 6, and a chroma of 4 or 6. The B21t horizon has dominant colors in a hue of 10YR, 7.5YR, or 2.5Y; a value of 5 or 6; and a chroma of 4 or 6. It has mottles in a hue of 10YR or 2.5Y, a value of 6 or 7, and a chroma of 1 or 2. It is silt loam or light silty clay loam. Some profiles have a B22t horizon that has colors similar to those in the B21t horizon. In other profiles the B22t horizon lacks a dominant color and is mottled in shades of yellow, brown, and gray. The B22t horizon is silt loam or light silty clay loam. Some profiles have a C horizon that either has dominant colors in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2 or is equally mottled with gray and brown. The C horizon is silt loam or light silty clay loam.

Morehead soils are near Whitley; Stendal, terrace; and Bonnie, terrace soils. Morehead soils are not as well drained as Whitley soils, but are better drained than the somewhat poorly drained Stendal, terrace, and poorly drained Bonnie, terrace soils.

Mo—Morehead silt loam (0 to 6 percent slopes). This soil is mostly on stream terraces and toe slopes. Included in mapping were small areas of Whitley and Tilsit soils.

The effective rooting depth is more than 48 inches. The hazard of erosion is moderate in cultivated areas where slopes are more than 2 percent.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but alfalfa is sometimes damaged by wetness caused by the seasonal high water table. Capability unit IIe–4; woodland suitability group 2w1.

Morehead Variant

The Morehead variant consists of deep, somewhat poorly drained soils that formed mainly in residuum weathered mostly from limestone. In places, however, the residuum is weathered partly from sandstone. These soils are on ridgetops.

In a representative profile the surface layer is grayish brown silt loam about 8 inches thick. The subsoil to a depth of 28 inches is pale brown, friable heavy silt loam that has yellowish brown and light brownish gray mottles, and to a depth of 62 inches is yellowish brown, friable light silty clay loam that has light gray mottles.

Available water capacity is high, and permeability is moderate. Natural fertility and organic matter content are low. The depth to a seasonal high water table ranges from 6 to 18 inches.

Representative profile of Morehead silt loam, high base variant, about 200 feet west of the store at Quail, which is about 6 miles southwest of Brodhead in Rockcastle County:

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; very friable; slightly acid; clear smooth boundary.

B21t—8 to 28 inches; pale brown (10YR 6/3) heavy silt loam; common fine distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few thin clay films; very strongly acid; gradual smooth boundary.

B22t—28 to 55 inches; yellowish brown (10YR 5/6) light silty clay loam; many medium prominent light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; friable; few thin clay films; strongly acid; gradual wavy boundary.

B23t—55 to 62 inches; yellowish brown (10YR 5/6) light silty clay loam; common medium prominent light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; friable; few thin clay films; slightly acid.

Thickness of the solum ranges from 60 to 80 inches. Depth to bedrock is more than 5 feet. Reaction is strongly acid or very strongly acid in the upper part of the B horizon, and it is medium acid to slightly acid in the lower part of the B horizon and all of the C horizon.

The Ap horizon has a hue of 10YR or 2.5Y, a value of 4 or 5, and a chroma of 2 or 3. The B21t horizon is pale brown (10YR 6/3), light yellowish brown (10YR 6/4 or 2.5Y 6/4), or yellowish brown (10YR 5/4, 5/6). It has mottles in a hue of 10YR or 2.5Y, a value of 6 or 7, and a chroma of 1 or 2. It is silt loam or light silty clay loam. The B22t horizon has a hue of 10YR or 2.5Y, a value of 5, and a chroma of 4 or 6. It has mottles in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. Some profiles lack a dominant matrix color. This horizon is silt loam or light silty clay loam. Color and texture of the B23t horizon are mostly the same as those of the B22t horizon, but in some profiles gray is the dominant color or the profile is equally mottled in shades of brown and gray. In some profiles the B23t horizon is replaced by a IIBt horizon that is yellowish red (5YR 5/6) or red (2.5YR 5/6) and has yellowish brown (10YR 5/6) and light gray (10YR 7/1) mottles. This horizon is silty clay.

Morehead variant soils are near Frederick, Lily, and Bedford soils. Morehead variant soils are not as clayey in the B2 horizon nor as well drained as Frederick soils. They are much deeper and have less sand throughout the profile than Lily soils, and they are not as well drained as those soils. They are not as well drained as

Bedford soils and lack the fragipan of those soils. They are similar to Morehead soils, but they are not as well drained and have higher base saturation in the lower part of the B horizon.

Mv—Morehead silt loam, high base variant (0 to 4 percent slopes). This soil is on ridgetops. Included in mapping were a few areas of Bedford and Cotaco soils and a few areas of a soil that is similar to this soil but is not as well drained.

The effective rooting depth is limited by the seasonal high water table. The water table is high during wet seasons and interferes with tillage and plant growth. The water table can be lowered by artificial drainage.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area, but it is not suited to alfalfa. Capability unit IIw–2; woodland suitability group 2w1.

Newark Series

The Newark series consists of deep, somewhat poorly drained soils that formed in alluvium derived mainly from upland soils underlain mostly by limestone but in places underlain partly by siltstone and sandstone. These soils are on flood plains and in depressions.

In a representative profile the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil to a depth of 18 inches is brown, friable silt loam that has dark yellowish brown and gray mottles, and to a depth of 40 inches is gray, friable silt loam that has dark yellowish brown mottles. The substratum to a depth of 60 inches is gray, friable silt loam that has dark grayish brown and dark yellowish brown mottles.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 6 to 18 inches.

Representative profile of Newark silt loam, about 1,300 feet east of Renfro Valley, which is about 2.5 miles north of Mount Vernon in Rockcastle County:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; slightly acid; clear wavy boundary.

B21—10 to 18 inches; brown (10YR 5/3) heavy silt loam; many fine distinct dark yellowish brown (10YR 4/4) mottles and few fine distinct gray (10YR 6/1) mottles; weak fine granular structure; friable; slightly acid; gradual wavy boundary.

B22g—18 to 40 inches; gray (10YR 5/1) heavy silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine granular structure; friable; slightly acid; gradual wavy boundary.

Cg—40 to 60 inches; gray (10YR 6/1) heavy silt loam; many medium distinct dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) mottles; massive; friable; 5 percent pebbles; slightly acid.

Thickness of the solum ranges from 20 to 40 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is medium acid to neutral. Coarse fragments make up as much as 5 percent, by volume, of the material in these soils.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. In some profiles it has few to common mottles in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The B21 horizon is dark brown (10YR 4/3), dark yellowish brown (10YR 4/4), or brown (10YR 5/3). It has a few to common mottles in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The B22g horizon has a hue of 10YR, a value of 5 to 7, and a chroma of 1 or 2. It has mottles in a hue of 10YR, a value of 4 or 5, and a chroma of 3 to 6. It is silt loam or light silty clay loam. The C horizon has color and textures similar to the B22g horizon, but in some profiles the Cg horizon is mostly gray, stratified sediment of sand, silt, and clay.

Newark soils are near Nolin and Lindside soils. Newark soils are somewhat poorly drained, Nolin soils are well drained, and Lindside soils are moderately well drained.

Nd—Newark silt loam (0 to 2 percent slopes). This soil is on flood plains and in depressions.

Included with this soil in mapping were areas where bedrock is as shallow as 3 feet, areas of soils that have a surface layer and subsoil of loam, and areas of soils that have more pebbles than is representative of the series. Also included were small areas of Nolin soils.

The effective rooting depth is limited by the seasonal high water table. Overflow is a hazard, especially late in winter or early in spring. This soil is somewhat poorly drained, and artificial drainage lowers the water table during wet seasons.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area, but is not suited to those crops that might be damaged by overflow. This soil is unsuited to alfalfa. Capability unit IIw–1; woodland suitability group 1w1.

Newark Variant

The Newark variant consists of deep, somewhat poorly drained gravelly soils that formed in alluvium derived mainly from upland soils underlain by chert and limestone. These soils are on flood plains along streams.

In a representative profile the surface layer is grayish brown gravelly silt loam about 7 inches thick. The subsoil to a depth of 16 inches is brown, very friable gravelly silt loam that has gray mottles, and to a depth of 32 inches is gray, very friable gravelly silt loam that has brown mottles. The substratum to a depth of 48 inches is gray, very friable gravelly silt loam that has yellowish brown mottles. Green shale bedrock is at a depth of 48 inches.

Available water capacity and permeability are moderate. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 6 to 18 inches.

Representative profile of Newark gravelly silt loam, gravelly variant, about 1¼ miles northeast of Roundstone School, which is about 7 miles north of Mount Vernon in Rockcastle County:

Ap—0 to 7 inches; grayish brown (10YR 5/2) gravelly silt loam; weak fine granular structure; very friable; 15 percent pebbles; medium acid; clear wavy boundary.

B21—7 to 16 inches; brown (10YR 5/3) gravelly

silt loam; common distinct gray (10YR 6/1) mottles; weak fine granular structure; very friable; 15 percent pebbles; medium acid; gradual wavy boundary.

B22g—16 to 32 inches; gray (10YR 6/1) gravelly silt loam; many distinct brown (10YR 5/3) mottles; weak fine granular structure; very friable; 15 percent pebbles; medium acid; gradual wavy boundary.

Cg—32 to 48 inches; gray (10YR 6/1) gravelly silt loam; common distinct yellowish brown (10YR 5/4) mottles; weak fine granular structure; very friable; 25 percent pebbles; medium acid; abrupt wavy boundary.

R—48 inches; green shale.

Thickness of the solum ranges from 20 to 40 inches. Depth to bedrock is more than 3½ feet. Throughout the profile the soil material is medium acid to neutral. Coarse fragments, mostly pebbles, make up 15 to 30 percent, by volume, of each horizon.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B21 horizon is brown (10YR 5/3) or dark brown (10YR 4/3). It has gray (10YR 6/1) or light gray (10YR 7/1) mottles. The B22g horizon is gray (10YR 6/1) and has brown (10YR 5/3), dark brown (10 4/3), or yellowish brown (10YR 5/4) mottles. The C horizon is gray (10YR 6/1) or light gray (10YR 7/1) and has brown (0YR 5/3) or yellowish brown (10YR 5/4) mottles.

Newark variant soils are near Newark silt loams and Nolin and Lindside soils. Newark variants have many more coarse fragments throughout the profile than Newark silt loams. They have many more coarse fragments throughout the profile than Nolin and Lindside soils and are not as well drained as those soils.

Ng—Newark gravelly silt loam, gravelly variant (0 to 2 percent slopes). This soil is on narrow flood plains. Included in mapping were a few areas of soils that are as shallow as 2½ feet to bedrock and a few areas where the soil material contains no gravel. Also included were small areas of a soil that is wetter than this one.

The effective rooting depth is limited by the seasonal high water table. Overflow is a hazard, especially late in winter or early in spring. This soil is somewhat poorly drained, and artificial drainage lowers the water table during wet seasons.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area, but it is not suited to those that might be damaged by overflow. This soil is unsuited to alfalfa. Capability unit IIw–1; woodland suitability group 1w1.

Nolin Series

The Nolin series consists of deep, well drained soils that formed in alluvium derived mainly from upland soils underlain mostly by limestone but in places underlain partly by siltstone and sandstone. These soils are on flood plains along streams and in depressions.

In a representative profile the surface layer is dark brown silt loam about 10 inches thick. The subsoil to a depth of 43 inches is dark brown, very friable heavy silt loam. The substratum to a depth of 60 inches is dark grayish brown, very friable silt loam that has gray and dark brown mottles.

Available water capacity is high, and permeability is moderate. Natural fertility is high, and organic matter content is low.

Representative profile of Nolin silt loam, about 900 feet northeast of Buckeye Christian Church, which is about 3 miles northeast of Mount Vernon in Rockcastle County:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; slightly acid; gradual wavy boundary.

B2—10 to 43 inches; dark brown (10YR 4/3) heavy silt loam; weak fine granular structure; very friable; slightly acid; gradual wavy boundary.

C—43 to 60 inches; dark grayish brown (10YR 4/2) silt loam; many fine distinct gray (10YR 6/1) mottles and common fine distinct dark brown (7.5YR 4/4) mottles; massive; very friable; slightly acid.

Thickness of the solum ranges from 40 to 72 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is medium acid to neutral.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B2 horizon has a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 3 or 4. In some profiles the lower part of the B2 horizon has mottles in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The B2 horizon is silt loam or light silty clay loam. The C horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2, 3, or 4. It has mottles in shades of gray and brown. It is silt loam or loam.

Nolin soils are near Lindside, Newark, and Newark variant soils. Nolin soils are well drained, while Lindside soils are moderately well drained and Newark soils and Newark variant soils are somewhat poorly drained.

No—Nolin silt loam (0 to 2 percent slopes). This soil is on flood plains and in depressions.

Included with this soil in mapping were areas of soils that are as shallow as 3 feet to bedrock and areas of soils that have a very dark grayish brown surface layer. Also included were small areas of Newark and Allegheny soils.

The effective rooting depth is more than 48 inches. Overflow is a hazard, especially late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but it is not suited to those that might be damaged by overflow. Capability unit I–1; woodland suitability group 1o1.

Opequon Series

The Opequon series consists of shallow, well drained soils that formed in residuum weathered from limestone. These soils are on upland side slopes.

In a representative profile the surface layer is dark brown light silty clay loam about 3 inches thick. The subsoil to a depth of 16 inches is yellowish red, very firm clay. Limestone bedrock is at a depth of 16 inches.

Available water capacity is very low, and permeability is moderately slow. Natural fertility is medium, and organic matter content is moderate.

Representative profile of Opequon silty clay loam in an area of Faywood-Opequon-Rock outcrop complex, 12 to 30 percent slopes; 1 mile southeast of Wildie, which is about 6 miles northeast of Mount Vernon in Rockcastle County:

A1—0 to 3 inches; dark brown (10YR 3/3) light silty clay loam; moderate medium subangular blocky structure; firm; many roots; neutral; clear smooth boundary.

B2t—3 to 16 inches; yellowish red (5YR 4/6) clay; moderate medium angular blocky structure; very firm; continuous clay films; neutral; abrupt wavy boundary.

R—16 inches; limestone bedrock.

Thickness of the solum and depth to bedrock range from 12 to 20 inches. Throughout the profile the soil material is medium acid to neutral.

The A1 horizon is dark brown (10YR 3/3, 4/3 or 7.5YR 3/2) silt loam or silty clay loam. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. It is silt loam or silty clay loam. The B2t horizon has a hue of 7.5YR, 5YR, or 2.5YR, a value of 4 or 5, and a chroma of 4 to 8. It is silty clay or clay. Some profiles have a thin horizon just above the bedrock that is red, brown, olive, or gray silty clay or clay.

Opequon soils are near Caneyville, Hagerstown, and Frederick soils. Opequon soils are not as deep to bedrock as Caneyville, Hagerstown, and Frederick soils.

Pope Series

The Pope series consists of deep, well drained soils that formed in alluvium derived from upland soils underlain by sandstone, siltstone, and shale. These soils are on flood plains.

In a representative profile the surface layer is dark brown fine sandy loam about 8 inches thick. The subsoil to a depth of 31 inches is dark yellowish brown, very friable fine sandy loam, and to a depth of 37 inches is yellowish brown, very friable fine sandy loam. The substratum to a depth of 61 inches is mottled, yellowish brown, strong brown, and light brownish gray, friable fine sandy loam.

Available water capacity is moderate, and permeability is moderately rapid. Natural fertility is medium, and organic matter content is low.

Representative profile of Pope fine sandy loam, about 350 feet south of State Road 638 and about 0.8 mile southeast of McWhorter Post Office, which is approximately 10 miles northeast of London in Laurel County:

Ap—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; very strongly acid; clear smooth boundary.

B2—8 to 31 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable; extremely acid; gradual wavy boundary.

B3—31 to 37 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; very friable; extremely acid; gradual wavy boundary.

C—37 to 61 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and light brownish gray (10YR 6/2) fine sandy loam; massive; friable; extremely acid.

Thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is more than 4 feet. Throughout the profile the soil material is strongly acid, very strongly acid, or extremely acid, but in places the reaction of horizons at or near the surface has been altered by liming. Pebbles make up 0 to 5 percent, by volume, of the solum and 0 to 10 percent, by volume, of the C horizon.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2, 3, or 4. The B horizon has a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 4 or 6. In the lower part of the B horizon some profiles have mottles in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The B horizon is fine sandy loam or loam. The C horizon is brown fine sandy loam, loamy sand, or loam. Some profiles have no gray mottles.

Pope soils are near Cuba and Stendal soils. Pope soils have more sand throughout the profile than Cuba soils. They have more sand in the A and B horizons and are better drained than somewhat poorly drained Stendal soils.

Po—Pope fine sandy loam (0 to 4 percent slopes). This soil is on flood plains. Included in mapping were areas of a soil that is similar to Pope soils, except it has gray mottles in the upper part of the subsoil and is only moderately well drained. Also included were areas of soils that are as shallow as 3 feet to bedrock, areas of soils that contain more pebbles than this one, and a few areas of soils that have slopes of as much as 20 percent.

The effective rooting depth is more than 48 inches. Overflow is a hazard, especially late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the area. In places plants are susceptible to damage by overflow, and at times plant production may be reduced during dry periods. Capability unit I–2; woodland suitability group 1o1.

Rigley Series

The Rigley series consists of deep, well drained soils that formed in loamy colluvium derived from upland soils underlain mostly by sandstone but in places underlain by siltstone and shale. These soils are on upland side slopes and colluvial toe slopes.

In a representative profile the surface layer is very dark grayish brown fine sandy loam about 3 inches thick. The subsoil to a depth of 15 inches is dark brown, very friable fine sandy loam, and to a depth of 54 inches is yellowish brown, very friable fine sandy loam. The substratum to a depth of 68 inches is light yellowish brown, firm heavy silty clay loam that has light brownish gray and yellowish red mottles.

Available water capacity is moderate, and permeability is moderately rapid. Natural fertility is medium, and organic matter content is low.

Representative profile of Rigley stony fine sandy loam, 30 to 60 percent slopes, about 100 feet below the dam for the Corbin City Reservoir, which is about 15 miles south of London in Laurel County:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable; many

roots; 10 percent pebbles; strongly acid; clear smooth boundary.

B1—3 to 15 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; many roots; 20 percent pebbles, fragments, and flagstones; strongly acid; gradual wavy boundary.

B2t—15 to 54 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine granular structure; very friable; few clay bridges; 15 percent stones, pebbles, fragments, and flagstones; strongly acid; clear wavy boundary.

IIC—54 to 68 inches; light yellowish brown (10YR 6/4) heavy silty clay loam; many fine distinct light brownish gray (10YR 6/2) mottles and few fine distinct yellowish red (5YR 5/6) mottles; massive; firm; 15 percent pebbles and shale fragments; very strongly acid.

Thickness of the solum ranges from 43 to 60 inches. Depth to bedrock is more than 4 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Sandstone fragments 1 to 20 inches in diameter make up 10 to 25 percent of the solum, and sandstone and shale fragments make up 0 to 35 percent of the C horizon.

The A1 horizon has a hue of 10YR, a value of 3 to 5, and a chroma of 2 or 3. It is loam or fine sandy loam. The B horizon has a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 4 to 8. The fine fraction is loam, fine sandy loam, or sandy loam. The C horizon has matrix colors and mottles in shades of red, brown, and gray. The fine fraction of the material in the C horizon is loamy or clayey.

Rigley soils are near Latham, Shelocta, and Steinsburg soils. Rigley soils are deeper than Latham soils. They contain much more sand in the solum than Latham and Shelocta soils. They are deeper to bedrock than Steinsburg soils.

RgF—Rigley stony fine sandy loam, 30 to 60 percent slopes. This soil is on side slopes. Sandstone fragments more than 10 inches in diameter are scattered at random on 3 to 20 percent of the surface and are in the soil. A few sandstone boulders as much as 30 feet in diameter are on the surface and in the soil.

Included with this soil in mapping were areas of Latham, Shelocta, and Steinsburg soils; areas of gravelly and cobbly soils; and sandstone cliffs ranging from 20 to 100 feet high. Also included were areas of soils that have as much as 30 percent of the surface covered by sandstone fragments and areas of soils that have no stones.

The effective rooting depth of this soil is more than 48 inches. This soil is so steep, so stony, or both, that it is poorly suited to uses other than woodland or wildlife habitat. Capability unit VIIs–1; woodland suitability group 2x1 on north- and east-facing slopes and 3x1 on south- and west-facing slopes.

Rock Outcrop

Rock outcrop is on side slopes. The outcrops of this land type are limestone. Included in mapping were areas of Brookside, Faywood, and Opequon soils.

This land type is better suited to woodland or wildlife habitat than to most other uses. Steepness and the many outcrops of bedrock make operation of farm machinery difficult in places.

Shelocta Series

The Shelocta series consists of deep, well drained soils that formed mainly in loamy colluvium derived from upland soils underlain by siltstone, sandstone, and shale. These soils are on upland side slopes and colluvial toe slopes.

In a representative profile the surface layer is 10 inches thick. It is dark brown silt loam in the upper 3 inches and brown, very friable silt loam in the lower 7 inches. The subsoil is yellowish brown, friable silt loam to a depth of 15 inches; yellowish brown, friable light silty clay loam between depths of 15 and 20 inches; strong brown, friable, channery light silty clay loam between depths of 20 and 31 inches; and strong brown, friable, channery heavy silty clay loam between depths of 31 and 45 inches. The substratum to a depth of 62 inches is yellowish brown, firm silty clay that has strong brown and light gray mottles.

Available water capacity is moderate to high, and permeability is moderate. Natural fertility is medium, and organic matter content is low.

Representative profile of Shelocta silt loam in an area of Shelocta-Rigley complex, 30 to 50 percent slopes, 5 miles west of Cold Hill, ½ mile west of Dog Branch Road, and 2 miles north of Forest Service Road 119 in Laurel County:

O11—1¼ inches to ½ inch; hardwood leaves and twigs.

O12—½ inch to 0; partly decomposed leaves and twigs.

A11—0 to 3 inches; dark brown (10YR 3/3) silt loam; moderate fine granular structure; very friable; 5 percent coarse fragments; many roots; very strongly acid; abrupt smooth boundary.

A12—3 to 10 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; very friable; 5 percent coarse fragments; common roots; very strongly acid; clear smooth boundary.

B1—10 to 15 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; 10 percent coarse fragments; common roots; very strongly acid; clear wavy boundary.

B21t—15 to 20 inches; yellowish brown (10YR 5/6) light silty clay loam; moderate fine subangular blocky structure; friable; distinct patchy clay films on peds; 10 percent coarse fragments; few roots; very strongly acid; clear wavy boundary.

B22t—20 to 31 inches; strong brown (7.5YR 5/6) channery light silty clay loam; moderate fine and medium subangular blocky structure; friable; faint patchy clay films on peds; 20 percent coarse fragments; few

roots; very strongly acid; gradual wavy boundary.

B3t—31 to 45 inches; strong brown (7.5YR 5/6) channery heavy silty clay loam; weak fine subangular blocky structure; friable; few faint patchy clay films on peds; 30 percent coarse fragments; few roots; very strongly acid; gradual wavy boundary.

IIC—45 to 62 inches; yellowish brown (10YR 5/6) silty clay; common medium distinct strong brown (7.5YR 5/6) and light gray (2.5YR 7/2) mottles; massive or weak relict platy structure; firm; partly weathered residual shale; very strongly acid.

Thickness of the solum ranges from 40 to 60 inches. Depth to hard sandstone bedrock or soft shale bedrock is more than 4 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Coarse fragments are mostly less than 6 inches in diameter. A few stones are intermixed with them. The fragments and stones make up 5 to 30 percent of the solum and 0 to 60 percent of the C horizon.

The A1 horizon has a hue of 10YR, a value of 3 or 4, and a chroma of 2 or 3. In cultivated areas the Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B2t and B3t horizons have a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 4, 6, or 8. The fines in the B2t horizon are light silty clay loam or silt loam. The fines in the B3t horizon are silty clay loam or silt loam. The fines in the C horizon are silt loam, silty clay loam, or silty clay.

Shelocta soils are near Rigley and Latham soils. Shelocta soils have less sand in the solum than Rigley soils. They are deeper and have less clay in the B horizon than Latham soils.

SbC—Shelocta gravelly silt loam, 6 to 12 percent slopes. This soil is mostly on toe slopes. It has a profile similar to the one described as representative of the series, but it has more pebbles in the surface layer.

Included with this soil in mapping were small areas of Whitley and Tilsit soils.

The effective rooting depth is more than 48 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. It is used mostly for hay and pasture. Capability unit IIIe–1; woodland suitability group 1o2.

SbD—Shelocta gravelly silt loam, 12 to 20 percent slopes. This soil is mostly on toe slopes. It has a profile similar to the one described as representative of the series, but it has more pebbles in the surface layer.

Included with this soil in mapping were small areas of Latham soils and soils that have no coarse fragments. Also included were areas of eroded soils that, if plowed and mixed, have a redder surface layer than the one in soil described as representative of the series.

The effective rooting depth is more than 48 inches. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture or hay than to cultivated crops, but it is suited to occasional cultivation. It is suited to most of the grasses and legumes commonly grown in the area. Capability unit IVe–1; woodland suitability group 1o2.

SbE—Shelocta gravelly silt loam, 20 to 30 percent slopes. This soil is mostly on benches of side slopes. It has a profile similar to the one described as representative of the series, but it has more pebbles in the surface layer.

Included with this soil in mapping were a few areas that have sandstone cliffs; areas of Latham soils on noses, benches, and fingerlike ridges; and a few areas of Steinsburg soils on the ridges just above the cliffs. Also included were a few areas where loose sandstone and an occasional large boulder are scattered at random on 3 to 15 percent of the surface.

The effective rooting depth is more than 48 inches. It is difficult to operate farm machinery on the steep slopes. The hazard of erosion makes this soil unsuited to cultivation.

This soil is suited to most grasses and legumes commonly grown in the area. It is also suited to trees. Capability unit VIe–2; woodland suitability group 1r1 on north- and east-facing slopes and 2r1 on south- and west-facing slopes.

ScF—Shelocta stony silt loam, 30 to 50 percent slopes. This soil is on side slopes. It has a profile similar to the one described as representative of the series, but it has more stones throughout the profile and more pebbles in the surface layer. A sandstone cliff 20 to 100 feet high is at the highest point in most areas. For a distance of about 100 feet below the cliff, many loose stones cover as much as 15 percent of the surface. A few sandstone boulders as much as 30 feet in diameter are on the surface and in the soil. Farther down the slope and away from the cliff, the stones become less common, making up only about 3 percent of the soil in most areas at lower elevations. These stones are scattered at random on the surface and in the soil. In areas without cliffs, stones make up less than 1 percent of the soil.

Included with this soil in mapping were areas of Latham, Rigley, and Steinsburg soils. Also included were areas of gravelly and cobbly soils and areas where as much as 30 percent of the surface layer is covered with pieces of sandstone.

The effective rooting depth of this soil is more than 48 inches. Because it is so steep or stony or both, this soil is poorly suited to uses other than woodland and wildlife habitat. Capability unit VIIs–1; woodland suitability group 1r1 on north- and east-facing slopes and 2r1 on south- and west-facing slopes.

SdD—Shelocta-Latham silt loams, 12 to 20 percent slopes. This complex is on side slopes and toe slopes. Shelocta soils make up 65 to 75 percent of this complex, and Latham soils make up about 25 to 35 percent. Shelocta soils are mainly on lower side slopes and toe slopes, but they are present wherever colluvium has accumulated. Latham soils are on upper side slopes and noses.

Included with this complex in mapping were areas of a soil that is similar to Latham soils, but the subsoil is much thicker. Included on north-facing slopes were areas of a soil that has a very dark gray surface layer. Also included were areas where the soil is severely eroded and small areas where stones cover 3 to 15 percent of the surface.

The effective rooting depth is more than 48 inches in Shelocta soils and is 20 to 40 inches in Latham soils. The hazard of erosion is very severe in cultivated areas.

This complex is better suited to pasture or hay than to cultivated crops, but it is suited to occasional cultivation. It is suited to most grasses and legumes commonly grown in the area. Capability unit IVe–1; woodland suitability group 1o2.

SdE—Shelocta-Latham silt loams, 20 to 30 percent slopes. This complex is on side slopes. Shelocta soils typically make up about 65 percent of this complex, but in some areas make up 50 to 80 percent; Latham soils typically make up about 35 percent, but in some areas make up 20 to 50 percent. Shelocta soils are mainly on lower side slopes, but they are present wherever colluvium has accumulated. Latham soils are on upper side slopes, benches, and noses.

Included with this complex in mapping were areas of Lily soils and areas of a soil that is similar to Latham soils, but its subsoil is much thicker. Also included were areas of a soil that is similar to Shelocta soils but has no coarse fragments; areas of eroded soils that, if plowed and mixed, have a redder surface layer that in places has more clay than the surface layer of the soil described as representative of the particular series; a few areas where stones cover 3 to 15 percent of the surface; areas of gravelly and channery soils; and a few areas where slopes are more than 30 percent.

The effective rooting depth is more than 48 inches in Shelocta soils and 20 to 40 inches in Latham soils. It is difficult to operate farm equipment on the steep slopes. The hazard of erosion makes these soils unsuited to cultivation.

This complex is suited to most grasses and legumes commonly grown in the area. It is also suited to trees. Capability unit VIe–2; woodland suitability group 1r1 on north- and east-facing slopes and 2r1 on south- and west-facing slopes.

SdF—Shelocta-Latham silt loams, 30 to 50 percent slopes. This complex is on side slopes. Shelocta soils typically make up about 65 percent of the complex, but in some areas make up 50 to 80 percent; Latham soils typically make up about 35 percent, but in some areas make up 20 to 50 percent. Shelocta soils are mainly on lower side slopes, on toe slopes, and in coves, but they are present wherever colluvium has accumulated.

Included with this complex in mapping were areas of Jefferson and Rigley soils and areas of a soil that is similar to Latham soils, but its subsoil is much thicker. Also included were areas of a soil that is similar to Shelocta soils but has no coarse fragments; areas of eroded soils that, if plowed and mixed, have a redder surface layer that in places has more clay than the surface layer in the soil that is representative of the particular series; a few areas that have stones covering 3 to 15 percent of the surface; areas of gravelly and channery soils; and a few areas where slopes are less than 30 percent.

The effective rooting depth is more than 48 inches in Shelocta soils and 20 to 40 inches in Latham soils.

Even if properly managed, this complex has limited use for pasture because it is so steep. This complex is well suited to woodland and wildlife habitat. Capability unit VIIe–1; woodland suitability group 1r1 on north- and east-facing slopes and 2r1 on south- and west-facing slopes.

SgE—Shelocta-Rigley complex, 20 to 30 percent slopes. This complex is on side slopes. Shelocta soils typically make up about 60 percent of the complex, but in some areas make up 40 to 80 percent; Rigley soils typically make up about 40 percent, but in some areas make up 20 to 60 percent. Shelocta soils have a surface layer of silt loam, and Rigley soils have a surface layer of fine sandy loam. Shelocta soils are mainly on lower side slopes, on toe slopes, and in coves, but they are present wherever colluvium has accumulated. Rigley soils are on side slopes where colluvium has accumulated. Loose pieces of sandstone are scattered at random over as much as 3 percent of the surface. A few loose boulders are near the streams and below cliffs.

Included with this complex in mapping were small areas of Latham soils on the nose of ridges and Steinsburg soils on some upper slopes, generally near sandstone rock outcrops. Included in some north-facing coves were small areas of soils that are similar to Shelocta and Rigley soils but have a very dark gray surface layer. Also included were small areas where stones cover 5 percent of the surface.

The effective rooting depth is more than 48 inches. It is difficult to operate farm equipment on the steep slopes. The hazard of erosion makes these soils unsuited to cultivation.

This complex is suited to most grasses and legumes commonly grown in the area. It is also suited to trees. Capability unit VIe–2; woodland suitability group 1r1 on north- and east-facing slopes and 2r1 on south- and west-facing slopes.

SgF—Shelocta-Rigley complex, 30 to 50 percent slopes. This complex is on side slopes. Shelocta soils typically make up about 60 percent of the complex, but in some areas make up 40 to 80 percent; Rigley soils typically make up about 40 percent, but in some areas make up 20 to 60 percent. Shelocta soils have a surface layer of silt loam, and Rigley soils have a surface layer of fine sandy loam. The Shelocta soils have the profile described as representative of the series. They are mainly on lower side slopes and toe slopes and in coves, but they are present wherever colluvium has accumulated. Rigley soils are on side slopes where colluvium has accumulated, especially below sandstone cliffs. Loose pieces of sandstone are scattered at random over as much as 3 percent of the surface, and a few loose boulders are near the streams and below cliffs.

Included with this complex in mapping were small areas of Latham soils on the nose of ridges. Included in some north-facing coves were small areas of soils that are similar to Shelocta and Rigley soils but have a very dark gray surface layer. In many places a sandstone cliff is just below the ridgetops. Also included were small areas where stones cover 5 percent of the surface.

The effective rooting depth of these soils is more than 48 inches. Even if properly managed, this complex has limited use for pasture because it is so steep. This complex is well suited to woodland and wildlife habitat. Capability unit VIIe–1; woodland suitability group 1r1 on north- and east-facing slopes and 2r1 on south- and west-facing slopes.

Steff Series

The Steff series consists of deep, moderately well drained soils that formed in alluvium derived from up-

land soils underlain by sandstone, siltstone, and shale. These soils are on flood plains of streams.

In a representative profile the surface layer is dark brown silt loam about 8 inches thick. The subsoil is brown, friable heavy silt loam to a depth of 18 inches; light yellowish brown, friable heavy silt loam that has gray and yellowish brown mottles between depths of 18 and 24 inches; and light gray, friable heavy silt loam that has yellowish brown mottles between depths of 24 and 48 inches. The substratum to a depth of 60 inches is pale brown, very friable sandy loam that has gray and yellowish brown mottles.

Available water capacity is high, and permeability is moderate. Natural fertility is high, and organic matter content is low. The depth to a seasonal high water table is 1½ to 2 feet.

Representative profile of Steff silt loam, about 1,800 feet southeast of the Louisville & Nashville Railroad crossing on State Road 229, which is about 2 miles southeast of London in Laurel County:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; medium acid; clear smooth boundary.

B1—8 to 18 inches; brown (10YR 5/3) heavy silt loam; weak fine granular structure; friable; very strongly acid; gradual wavy boundary.

B21—18 to 24 inches; light yellowish brown (10YR 6/4) heavy silt loam; many fine distinct gray (10YR 6/1) and yellowish brown (10 YR 5/6) mottles; weak fine granular structure; friable; very strongly acid; gradual wavy boundary.

B22g—24 to 48 inches; light gray (10YR 7/1) heavy silt loam; many coarse prominent yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; very strongly acid; gradual wavy boundary.

IIC—48 to 60 inches; pale brown (10YR 6/3) sandy loam; common fine distinct gray (10YR 6/1) and yellowish brown (10YR 5/6) mottles; single grained; very friable; very strongly acid.

Thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming.

The Ap horizon is dark brown (10YR 4/3) or dark grayish brown (10YR 4/2). The B1 and B21 horizons have a hue of 10YR, a value of 4 to 6, and a chroma of 3 or 4. The B21 horizon has mottles in a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. The B21 horizon in some profiles does not have mottles with a chroma of 6. The B22g horizon has a hue of 10YR, a value of 5 to 7, and a chroma of 1 or 2. Mottles are in shades of brown. The B22g horizon in some profiles does not have a dominant matrix color and is in shades of gray and brown. The IIC horizon is in shades of gray and brown. Some profiles have a C horizon that has the same colors as the IIC horizon but is silt loam.

Steff soils are near Cuba, Pope, Stendal, and Bonnie soils. Steff soils are not as well drained as Cuba and Pope soils. They are better drained than the somewhat poorly drained Stendal and poorly drained Bonnie soils.

Sh—Steff silt loam (0 to 2 percent slopes). This soil is on flood plains of streams. Included with this soil in mapping were small areas of Cuba, Pope, and Stendal soils. Also included were small areas where bedrock is as shallow as 3 feet.

The effective rooting depth is more than 48 inches. Overflow is a hazard, especially late in winter or early in spring. The soil is moderately well drained, and artificial drainage improves plant growth during wet seasons.

This soil is suited to most crops and pasture and hay plants commonly grown in the area, but is not suited to those that might be damaged by overflow. Capability unit I–3; woodland suitability group 1w1.

Steinsburg Series

The Steinsburg series consists of moderately deep, well drained soils that formed in residuum weathered from sandstone. These soils are on ridgetops and side slopes.

In a representative profile the surface layer is sandy loam about 5 inches thick. It is dark brown in the upper 2 inches and yellowish brown in the lower 3 inches. The subsoil to a depth of 25 inches is yellowish brown, very friable sandy loam. The substratum to a depth of 35 inches is yellowish red, very friable channery loamy sand. Sandstone bedrock is at a depth of 35 inches.

Available water capacity is low, and permeability is moderately rapid. Natural fertility and organic matter content are low.

Representative profile of Steinsburg sandy loam, 6 to 12 percent slopes, about 2 miles south of State Road 80 on State Road 1226; in the Daniel Boone National Forest in Laurel County:

O11—2 inches to ⅛ inch; hardwood leaves and twigs.

O12—⅛ inch to 0; partly decomposed leaves and twigs.

A1—0 to 2 inches; dark brown (10YR 3/3) sandy loam; weak fine granular structure; loose; 1 percent coarse fragments; many roots; very strongly acid; abrupt smooth boundary.

A2—2 to 5 inches; yellowish brown (10YR 5/4) sandy loam; weak medium granular structure; very friable; 2 percent coarse fragments; many roots; very strongly acid; clear smooth boundary.

B—5 to 25 inches; yellowish brown (10YR 5/6) sandy loam; weak fine and medium subangular blocky structure; very friable; 3 percent coarse fragments; common roots; very strongly acid; gradual wavy boundary.

C—25 to 35 inches; yellowish red (5YR 5/6) channery loamy sand; single grained; very friable; 30 percent coarse fragments; few roots; very strongly acid; abrupt wavy boundary.

R—35 inches; sandstone bedrock.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Throughout the profile the soil material is strongly acid or very strongly acid, but in

places the reaction of horizons at or near the surface has been altered by liming. Coarse fragments make up 0 to 15 percent of the solum and 20 to 35 percent of the C horizon.

The A1 horizon has a hue of 10YR, a value of 3 to 5, and a chroma of 2 to 4. In cultivated areas the Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. Some profiles do not have an A2 horizon. The B horizon has a hue of 10YR or 7.5YR, a value of 5, and a chroma of 4 or 6. The C horizon has a hue of 10YR, 7.5YR, or 5YR; a value of 5; and a chroma of 4 or 6. It is loamy sand or sandy loam or their channery analogs. Some profiles do not have a C horizon.

These soils have thicker A and B horizons than is representative of the series, but this difference does not alter their usefulness and behavior.

Steinsburg soils are near Lily, Rigley, and Shelocta soils. Steinsburg soils have less clay in the B horizon than Lily soils. They are not as deep to bedrock as Rigley soils. They have much more sand throughout the profile than Shelocta soils and are not as deep to bedrock as those soils.

SkC—Steinsburg sandy loam, 6 to 12 percent slopes. This soil is on the ridgetops and side slopes. It has the profile described as representative of the series.

Included with this soil in mapping were a few areas of Lily and Rigley soils. Also included were small areas of Rock outcrop and areas where the soil is less than 20 inches deep to bedrock.

The effective rooting depth is 20 to 40 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area, but alfalfa requires intensive fertilization and ample liming. Capability unit IIIe–5; woodland suitability group 3o1.

SlD—Steinsburg rocky sandy loam, 12 to 20 percent slopes. This soil is on ridgetops and side slopes. It is intermingled with areas of Rock outcrop. This soil generally makes up about 96 percent of an area but ranges from 85 to 97 percent. The Rock outcrop consists of sandstone bedrock that crops out at random on the surface.

Included with this soil in mapping were areas of Lily soils and rock cliffs. Also included were areas where the soil is less than 20 inches deep to bedrock and a few areas where boulders are common on the surface.

The effective rooting depth is 20 to 40 inches. Tillage is difficult. Rockiness makes this soil unsuited to cultivation.

This soil is suited to grasses and legumes, but is better suited to plants that resist drought. It is well suited to trees. Capability unit VIs–1; woodland suitability group 3o1.

SlF—Steinsburg rocky sandy loam, 20 to 50 percent slopes. This soil is on side slopes. It is intermingled with areas of Rock outcrop. This soil generally makes up about 95 percent of the unit but ranges from 85 to 97 percent. Rock outcrop consists of sandstone bedrock that crops out at random on the surface.

Included with this soil in mapping were areas of Rigley and Latham soils. Also included were areas where the soil is less than 20 inches deep to bedrock.

Because it is so steep and rocky in most places, this soil generally is poorly suited to uses other than woodland. A few areas can be used for limited pasture, but most areas are in woods. Capability unit VIIs–1; woodland suitability group 3r1.

Stendal Series

The Stendal series consists of deep, somewhat poorly drained soils that formed in loamy alluvium derived from upland soils underlain by sandstone, siltstone, and shale. These soils are on flood plains.

In a representative profile the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil to a depth of 17 inches is brown, friable silt loam that has light brownish gray mottles, and to a depth of 40 inches is light gray, friable silt loam that has light yellowish brown mottles. The substratum to a depth of 60 inches is light gray, very friable fine sandy loam that has yellowish brown and pale brown mottles.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 6 to 18 inches.

Representative profile of Stendal silt loam, about 900 feet southeast of the junction of State Road 229 and the Louisville & Nashville Railroad, which is about 2 miles southeast of London in Laurel County:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

B1—6 to 17 inches; brown (10YR 5/3) silt loam; common fine faint light brownish gray (10YR 6/2) mottles; weak medium granular structure; friable; very strongly acid; gradual wavy boundary.

B2g—17 to 40 inches; light gray (10YR 7/1) silt loam; common medium distinct light yellowish brown (10YR 6/4) mottles; weak medium granular structure; friable; very strongly acid; gradual wavy boundary.

IICg—40 to 60 inches; light gray (10YR 7/1) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; massive; very friable; very strongly acid.

Thickness of the solum ranges from 30 to 40 inches. Depth to bedrock is more than 5 feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming.

The Ap horizon is dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2). The B1 horizon is brown (10YR 5/3) or pale brown (10YR 6/3) and has mottles in a hue of 10YR; a value of 5, 6, or 7; and a chroma of 1 or 2. The B2g horizon has a hue of 10YR, a value of 5, 6, or 7, and a chroma of 1 or 2. It has mottles in a hue of 10YR, a value of 5 or 6, and a chroma of 4 or 6. The IICg horizon has a hue of 10YR, a value of 6 or 7, and a chroma of 1 or 2. It has mottles in shades of brown. In some profiles the IICg horizon is replaced by a Cg horizon that is silt loam.

Stendal soils are near Cuba, Steff, and Bonnie soils. The somewhat poorly drained Stendal soils are not as

well drained as the well drained Cuba and moderately well drained Steff soils, but they are better drained than the poorly drained Bonnie soils.

Sn—Stendal silt loam (0 to 4 percent slopes). This soil is on narrow flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Steff and Bonnie soils. Also included were a few areas of sandy soils and a few areas of soils that are as shallow as 24 inches to bedrock.

The effective rooting depth is limited by the seasonal high water table. Overflow is a hazard, especially late in winter or early in spring. This soil is somewhat poorly drained, and artificial drainage lowers the water table during wet seasons.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area, but it is not suited to those that might be damaged by overflow. It is unsuited to alfalfa. Capability unit IIw–1; woodland suitability group 1w1.

So—Stendal silt loam, terrace (0 to 4 percent slopes). This soil is mostly on stream terraces above the flood plain, but a few areas are on fans and flood plains along tributary streams.

Included with this soil in mapping were a few areas of Bonnie, terrace, soils and small areas of soils that are as shallow as 24 inches to bedrock. Also included were a few small areas of Morehead soils.

The effective rooting depth is limited by the seasonal high water table. This soil is somewhat poorly drained, and artificial drainage can be used to lower the water table during wet seasons.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area. It is generally unsuited to alfalfa. Capability unit IIw–1; woodland suitability group 1w1.

Stendal Variant

The Stendal variant consists of deep, somewhat poorly drained, moderately coarse textured soils that formed in alluvium derived from upland soils underlain by sandstone, siltstone, and shale. These soils are on flood plains.

In a representative profile the surface layer is dark brown fine sandy loam to a depth of 2 inches; olive brown, very friable fine sandy loam between depths of 2 and 6 inches; and yellowish brown, very friable fine sandy loam between depths of 6 and 11 inches. The subsoil to a depth of 16 inches is light yellowish brown, very friable fine sandy loam that has light gray and yellowish brown mottles. Between depths of 16 and 23 inches, it is light brownish gray, very friable fine sandy loam that has yellowish brown and yellowish red mottles. Below this, to a depth of 50 inches, the subsoil is light brownish gray, very friable gravelly fine sandy loam that has strong brown and yellowish brown mottles.

Available water capacity is moderate, and permeability is moderately rapid. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 6 to 18 inches.

Representative profile of Stendal fine sandy loam, sandy variant, about 100 yards north of Craig's Creek Bridge on Forest Service Road 60 in Laurel County:

O11—2 inches to ¼ inch; loose leaves, needles, and twigs.

O12—¼ inch to 0; partly decomposed leaves, needles, and twigs.

A11—0 to 2 inches; dark brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; many roots; very strongly acid; abrupt smooth boundary.

A12—2 to 6 inches; olive brown (2.5Y 4/4) fine sandy loam; weak medium and coarse granular structure; very friable; many roots; very strongly acid; clear smooth boundary.

A2—6 to 11 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; very friable; many roots; extremely acid; clear wavy boundary.

B1—11 to 16 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; common fine faint light gray (10YR 7/2) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; very friable; many roots; extremely acid; clear wavy boundary.

B2g—16 to 23 inches; light brownish gray (2.5Y 6/2) fine sandy loam; common fine distinct yellowish brown (10YR 5/8) and yellowish red (5Y 4/8) mottles; weak medium subangular blocky structure; very friable; 3 percent pebbles; common roots; extremely acid; clear wavy boundary.

B3g—23 to 50 inches; light brownish gray (2.5Y 6/2) gravelly fine sandy loam; common fine prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/8) mottles; weak very fine subangular blocky structure parting to massive; friable; 30 percent pebbles; few roots; extremely acid.

Thickness of the solum ranges from 30 to 55 inches. Depth to bedrock is more than 3½ feet. All of the profile is strongly acid, very strongly acid, or extremely acid, but in places the reaction of horizons at or near the surface has been altered by liming. Pebbles make up 0 to 30 percent, by volume, of each horizon.

In cultivated areas the Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B1 horizon has a hue of 2.5Y or 10YR, a value of 4 to 6, and a chroma of 3 to 6. It has mottles in a hue of 2.5Y or 10YR, a value of 6 or 7, and a chroma of 1 or 2. The B2g and B3g horizons have a hue of 2.5Y or 10YR, a value of 6 or 7, and a chroma of 1 or 2. They have mottles in shades of brown or red. Some profiles have a C horizon that is gray and has brown mottles.

Stendal variant soils are near Pope and Bonnie soils. Stendal variant soils are much wetter than the well drained Pope soils. They have more sand in the A and B horizons and are better drained than the poorly drained Bonnie soils.

Ss—Stendal fine sandy loam, sandy variant (0 to 4 percent slopes). This soil is on narrow flood plains along streams. Included in mapping were small areas of Pope and Bonnie soils.

The effective rooting depth is limited by the seasonal high water table. Overflow is a hazard, especially late in winter or early in spring. This soil is somewhat poorly drained, and artificial drainage lowers the water table during wet seasons.

If properly drained, this soil is suited to most crops and pasture and hay plants commonly grown in the area, but is not suited to those that might be damaged by overflow. If undrained, this soil is unsuited to alfalfa. Capability unit IIw–1; woodland suitability group 1w1.

Strip Mines

St—Strip mines. This land type consists of areas where the material above a coal seam has been removed to allow open pit mining and the pit has been filled with spoil material. Areas of strip mined land are throughout Laurel County, but in Rockcastle County they are limited to the eastern part of the county.

Strip mined land is a mixture of fine earth and rock, and the proportions of each vary greatly from place to place. Some areas have few coarse fragments, and others have so many coarse fragments that tillage is difficult. Proportions of sand, silt, and clay vary greatly from place to place and from layer to layer. Adjacent layers within the same profile vary widely; some are silty, and some are loamy, and some are clayey. Slope also varies greatly. Slopes are so steep in some areas that it is difficult to use farm machinery.

Natural fertility and organic matter content are low. The effective rooting depth is generally more than 60 inches. The response of pasture and hay plants to lime and fertilizer is generally fair, depending upon the rock content.

Use of these areas is determined by steepness and rock content. Not assigned to a capability unit or woodland suitability group.

Tilsit Series

The Tilsit series consists of deep, moderately well drained soils that formed in residuum or stream sediment weathered mostly from sandstone, siltstone, and shale. These soils have a fragipan in the subsoil. They are on uplands and stream terraces.

In a representative profile the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil to a depth of 11 inches is light yellowish brown, friable silt loam, and to a depth of 26 inches is light olive brown, friable silt loam that has gray and brownish yellow mottles in the lower part. The fragipan to a depth of 43 inches is light olive brown, very firm silt loam that has yellowish brown and gray mottles. Sandstone bedrock is at a depth of 43 inches.

Available water capacity is moderate, and permeability is slow. Natural fertility is medium, and organic matter content is low. The depth to a seasonal high water table ranges from 18 to 24 inches.

Representative profile of Tilsit silt loam, 2 to 6 percent slopes, on the north side of State Road 1376, about 1,700 feet east of Olive-Gilead Methodist Church, which is about 9 miles north of London in Laurel County:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.

B1—8 to 11 inches; light yellowish brown (2.5Y 6/4) silt loam; weak fine and medium subangular blocky structure; friable; medium acid; clear wavy boundary.

B21t—11 to 24 inches; light olive brown (2.5Y 5/4) heavy silt loam; moderate fine and medium subangular blocky structure; friable; few thin clay films; very strongly acid; clear wavy boundary.

B22t—24 to 26 inches; light olive brown (2.5Y 5/4) heavy silt loam; few fine distinct brownish yellow (10YR 6/6) and gray (10YR 6/1) mottles; moderate fine and medium subangular blocky structure; friable; few thin clay films; very strongly acid; clear wavy boundary.

Bxt—26 to 43 inches; light olive brown (2.5Y 5/4) silt loam; common medium distinct yellowish brown (10YR 5/6) and gray (10YR 6/1) mottles; strong very coarse prismatic structure; very firm, brittle and compact; few thin patchy clay films; very strongly acid; abrupt wavy boundary.

R—43 inches; sandstone bedrock.

Thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 3½ feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Coarse fragments make up 0 to 10 percent, by volume, of the solum and 10 to 30 percent, by volume, of the C horizon, where present. Depth to the fragipan ranges from 20 to 28 inches.

The Ap horizon has a hue of 2.5Y or 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B1 and B2t horizons have a hue of 2.5Y or 10YR, a value of 5 or 6, and a chroma of 4 to 8. The lower part of the B2t horizon has mottles in shades of gray. The C horizon, where present, has the same colors as the B horizon. The fine fraction is silt loam, silty clay loam, or silty clay. The R horizon is acid sandstone, siltstone, or shale and is interbedded in places.

Tilsit soils are near Whitley soils. Tilsit soils have a fragipan and are not as well drained as Whitley soils.

TlB—Tilsit silt loam, 2 to 6 percent slopes. This soil is on ridgetops and stream terraces. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Whitley soils and a few areas of soils that have slopes of more than 6 percent. Also included were areas of a soil that has a higher content of coarse fragments than is representative of the series.

The effective rooting depth is 20 to 28 inches. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the area. Alfalfa is generally short-lived because of excess water in the rooting zone caused by the slow permeability of the fragipan. This soil is used mostly for corn, hay, and pasture. Capability unit IIe–4; woodland suitability group 3w1.

TlC—Tilsit silt loam, 6 to 12 percent slopes. This soil is on side slopes of ridges.

Included with this soil in mapping were small areas of Whitley soils and a few areas of soils that have slopes of more than 12 percent. Also included were areas of a soil that has a higher content of coarse fragments than is representative of the series.

The effective rooting depth is 20 to 28 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the area. Alfalfa is generally short-lived because of excess water in the rooting zone caused by the slow permeability of the fragipan. This soil is used mostly for corn, hay, and pasture. Capability unit IIIe–4; woodland suitability group 3w1.

Weikert Series

The Weikert series consists of shallow, well drained soils that formed in residuum weathered from siltstone. These soils are on upland side slopes.

In a representative profile the surface layer is dark brown channery silt loam about 4 inches thick. The subsoil to a depth of 18 inches is yellowish brown, friable channery silt loam. Hard siltstone bedrock is at a depth of 18 inches.

Available water capacity is very low, and permeability is moderately rapid. Natural fertility and organic matter content are low.

Representative profile of Weikert channery silt loam, 40 to 80 percent slopes, about 100 yards west of U.S. Highway 25; about 1 mile south of Conway, which is about 9 miles north of Mount Vernon in Rockcastle County:

A1—0 to 4 inches; dark brown (10YR 3/3) channery silt loam; weak fine granular structure; very friable; many roots; 40 percent siltstone fragments; medium acid; clear smooth boundary.

B2—4 to 18 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine subangular blocky structure; friable; common roots; 45 percent siltstone fragments; very strongly acid; abrupt wavy boundary.

R—18 inches; hard siltstone bedrock.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Siltstone fragments make up 35 to 50 percent, by volume, of the profile.

The A1 horizon is dark brown (10YR 3/3, 4/3). The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B horizon has a hue of 10YR or 7.5YR, a value of 5 or 6, and a chroma of 4 or 6. Some profiles have a C horizon that has matrix colors in shades of brown.

Weikert soils are near Latham, Berea, and Shelocta soils. Weikert soils are much more silty and channery than clayey Latham soils. They have thinner A and B horizons than Berea and Shelocta soils, and they are not as deep to bedrock as those soils.

WcF—Weikert channery silt loam, 40 to 80 percent slopes. This soil is on side slopes. It is about 40 percent siltstone fragments. A few stones are scattered at random on the surface and are embedded in the soil material.

Included with this soil in mapping were eroded areas, a few areas where slopes are as low as 20 percent, and a few stony areas. Also included were areas of Latham and Shelocta soils and areas of a soil that is similar to Weikert soils but is deeper to bedrock and is medium acid to neutral in the lower part of the profile.

The effective rooting depth is 10 to 20 inches. Even if it is properly managed, this soil has limited use for pasture because it is so steep and channery. This soil is suited to trees. Most areas are wooded. Capability unit VIIs–1; woodland suitability group 4d2 on north- and east-facing slopes and 5d1 on south- and west-facing slopes.

Whitley Series

The Whitley series consists of deep, well drained soils that formed in residuum or alluvium weathered from acid siltstone, sandstone, shale, or a mixture of all three. The development of these soils was also probably influenced by thin loess deposits. These soils are on uplands, stream terraces, and fans.

In a representative profile the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of 23 inches is yellowish brown, friable light silty clay loam, and to a depth of 40 inches is yellowish brown, friable light silty clay loam that has pale brown and strong brown mottles. The substratum to a depth of 60 inches is brownish yellow, friable gravelly light silty clay loam. Sandstone bedrock is at a depth of 60 inches.

Available water capacity is high, and permeability is moderate. Natural fertility is medium, and organic matter content is low.

Representative profile of Whitley silt loam, 2 to 6 percent slopes, about 900 feet west of U.S. Highway 25 and about ¾ mile southwest of Lily, which is about 7 miles south of London in Laurel County:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; slightly acid; clear smooth boundary.

B21t—8 to 23 inches; yellowish brown (10YR 5/6) light silty clay loam; weak fine subangular blocky structure; friable; few roots; few clay films; strongly acid; clear wavy boundary.

B22t—23 to 40 inches; yellowish brown (10YR 5/6) light silty clay loam; common medium distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few roots; few clay films; 5 percent sandstone pebbles; very strongly acid; gradual wavy boundary.

C—40 to 60 inches; brownish yellow (10YR 6/6) gravelly light silty clay loam; massive; friable; 15 percent sandstone pebbles and 5 percent sandstone flagstones and fragments; very strongly acid; abrupt wavy boundary.

R—60 inches; hard sandstone bedrock.

Thickness of the solum ranges from 35 to 48 inches. Depth to soft laminated shale bedrock or hard sandstone or siltstone bedrock is more than 3½ feet. Throughout the profile the soil material is strongly acid or very strongly acid, but in places the reaction of horizons at or near the surface has been altered by liming. Coarse fragments make up 0 to 6 percent, by volume, of the solum and 0 to 20 percent, by volume, of the C horizon.

The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. Some profiles have a B1 horizon that is yellowish brown (10YR 5/4, 5/6) or light olive brown (2.5Y 5/4, 5/6) silt loam. The Bt horizon is strong brown (7.5YR 5/6, 5/8), yellowish brown (10YR 5/4, 5/6, 5/8), or light olive brown (2.5Y 5/4, 5/6). The upper part of the Bt horizon is silt loam or light silty clay loam, and the lower part is light silty clay loam to silty clay. The C horizon is brownish yellow (10YR 6/6, 6/8), yellowish brown (10YR 5/4, 5/6, 5/8), or strong brown (7.5YR 5/6) silt loam, silty clay loam, loam, clay loam, silty clay, clay, or their gravelly analogs. In some profiles, especially where the texture is clayey, the C horizon has mottles in shades of red, brown, or gray. The R horizon ranges from gray, brown, or red soft laminated clay shale to brown or gray hard siltstone or sandstone.

Whitley soils are near Latham, Shelocta, Tilsit, and Lily soils. Whitley soils are not as clayey in the upper part of the B horizon as Latham soils. They have fewer coarse fragments in the A and B horizons than Shelocta soils. Whitley soils are better drained than Tilsit soils, and they lack the fragipan of those soils. They are deeper to bedrock than Lily soils, and they lack the sand throughout the profile of those soils.

WhB—Whitley silt loam, 2 to 6 percent slopes. This soil is on ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were as much as 20 percent Tilsit soils and small areas of Latham and Lily soils.

The effective rooting depth is more than 42 inches. The hazard of erosion is moderate in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. Capability unit IIe–1; woodland suitability group 2o1.

WhC—Whitley silt loam, 6 to 12 percent slopes. This soil is on ridgetops and side slopes.

Included with this soil in mapping were small areas of Latham, Lily, and Tilsit soils. Also included were a few areas where the soil is severely eroded and a few areas where slopes are as much as 20 percent.

The effective rooting depth is more than 42 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay commonly grown in the area. Capability unit IIIe–1; woodland suitability group 2o1.

WhD—Whitley silt loam, 12 to 20 percent slopes. This soil is mostly on side slopes. Included in mapping were areas of Latham, Shelocta, and Lily soils and small areas of a soil that is 20 to 38 inches deep to bedrock. Also included were areas of eroded soils that, if plowed and mixed, have a brighter colored surface layer than this soil. In places this surface layer has more clay than the surface layer in the soil described as representative of the series.

The effective rooting depth is more than 42 inches. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suited to occasional cultivation. It is suited to all grasses and legumes commonly grown in the area. Capability unit IVe–1; woodland suitability group 2o1.

WtA—Whitley silt loam, terrace, 0 to 2 percent slopes. This soil is on stream terraces and fans. It has a profile similar to the one described as representative of the series, but it has fewer coarse fragments in the lower part of the profile and in most places is deeper to bedrock.

Included with this soil in mapping were a few areas of Allegheny and Morehead soils. Also included were areas of a soil that is similar to Whitley, terrace, soils except that it has a very dark grayish brown surface layer and reaction is nearly neutral. A few areas where slopes are as much as 10 percent were also included.

The effective rooting depth is more than 48 inches. Some areas are subject to infrequent overflow, especially late in winter or early in spring.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. Capability unit I–4; woodland suitability group 2o1.

WtB—Whitley silt loam, terrace, 2 to 6 percent slopes. This soil is on stream terraces and fans. It has a profile similar to the one described as representative of the series, but it has fewer coarse fragments in the lower part of the profile and in most places is deeper to bedrock. Included in mapping were small areas of Morehead soils.

The effective rooting depth of this soil is more than 48 inches. Some areas are subject to infrequent overflow, especially late in winter or early in spring. The hazard of erosion is moderate in cultivated areas.

This soil is suited to all crops and pasture and hay commonly grown in the area. Capability unit IIe–1; woodland suitability group 2o1.

WtC—Whitley silt loam, terrace, 6 to 12 percent slopes. This soil is on stream terraces and fans. It has a profile similar to the one described as representative of the series, but it has fewer coarse fragments in the lower part of the profile than this soil and in most places is deeper to bedrock.

Included with this soil in mapping were areas of a soil that is similar to Whitley, terrace, soils, but it has gray mottles at a depth of about 28 inches.

The effective rooting depth is more than 48 inches. The hazard of erosion is severe in cultivated areas.

This soil is suited to all crops and pasture and hay plants commonly grown in the area. Capability unit IIIe–1; woodland suitability group 2o1.

Use and Management of the Soils

The information presented in this section can be used as a general guide for use and management of the soils in Laurel and Rockcastle Counties. Suitability of soils for crops and pasture, for woodland, for wildlife

habitat, and for engineering uses are discussed in the first part of the section; town and country planning is discussed in the latter part.

Use of Soils for Crops and Pasture

The general principles of management that apply to all of the soils used for farming in Laurel and Rockcastle Counties are discussed in the first part of this subsection. In the second part the capability classification system is explained; the capability units are described; and the use, suitability, and management requirements for each of the units is discussed. The third part of the subsection presents the estimated yields per acre of the principal crops under two levels of management.

General principles of soil management

Some principles of soil management are general enough to apply to all soils suitable for farm crops and pasture throughout the survey area, although individual soils or groups of soils require different kinds of management. These general principles of management are discussed in the following paragraphs.

Most soils in the survey area need lime and fertilizer. The amounts needed depend on the natural content of lime and plant nutrients, which are determined by laboratory analyses of soil samples; on the needs of the crop; and on the level of yield desired. Only general suggestions for applications of lime and fertilizer are presented.

Most of the soils in Laurel and Rockcastle Counties were never high in organic matter content, and it is not economical to build up the content to a high level. It is important, however, to return organic matter by adding farm manure; leaving plant residue on the surface; and growing sod crops, cover crops, and green manure crops.

Tillage tends to break down soil structure. It should be kept to the minimum necessary to prepare a seedbed and control weeds. Maintaining the organic matter content of the plow layer helps to protect the soil structure.

On wet soils such as Bonnie silt loam, yields of cultivated crops can be increased by open ditch drainage or tile drainage. Tile drains generally provide better drainage than open ditches. Suitable outlets are needed for either tile drains or open ditches.

All of the gently sloping and steeper soils that are cultivated are subject to erosion. Runoff and erosion occur mostly while a cultivated crop is growing or soon after one has been harvested. On soils such as Whitley silt loam, 2 to 6 percent slopes, a cropping system that controls runoff and erosion is needed along with other erosion control practices. In this survey the term "cropping system" refers to the sequence of crops grown combined with management practices that include minimum tillage, mulch planting, use of crop residue, growing of cover crops and green manure crops, and use of lime and fertilizer. Other erosion control practices are contour cultivation, terracing, contour stripcropping, diversion of runoff, and use of grassed waterways. The effectiveness of a particular combination of these measures differs from one soil to another, but different combinations can be equally effective on the same soil. The local representative of the Soil Conservation Service will assist land users in planning an effective combination of practices.

Pasture vegetation is an effective control of erosion on all but a few of the soils that are subject to erosion. A high level of pasture management is needed on some soils to provide enough ground cover to keep them from eroding. A high level of pasture management provides for fertilization, control of grazing, selection of pasture mixture, and other practices that help in maintaining good ground cover and forage for grazing. Grazing is controlled by rotating the livestock from one pasture to another and by providing idle periods after each grazing period to allow for regrowth of plants. On some soils it is important to select pasture mixtures that require the least amount of renovation to maintain good ground cover and forage for grazing.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or for engineering.

In the capability system all kinds of soils are grouped at three levels: the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat. There are no class V soils in the survey area.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit

their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, water supply, or esthetic purposes. There are no class VIII soils in the survey area.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States but not in Laurel or Rockcastle Counties, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIe–2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Laurel and Rockcastle Counties are described, and suggestions for the use and management of the soils are given.

CAPABILITY UNIT I–1

This capability unit consists of nearly level, well drained soils on flood plains. These soils have a surface layer of very friable silt loam. Their subsoil is silt loam. The effective rooting depth is 48 to 60 inches or more. Depth to bedrock is more than 60 inches.

The soils of this unit are well suited to corn and soybeans. They are also well suited to such pasture and hay crops as Kentucky bluegrass, timothy, tall fescue, orchard grass, alfalfa, red and ladino clover, and annual and sericea lespedeza.

Overflow is the main hazard, and it occurs mostly late in winter or early in spring. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT I–2

This capability unit consists of nearly level to gently sloping, well drained soils on flood plains. These soils have a surface layer of very friable loam or fine sandy loam. Their subsoil is loam or fine sandy loam. The effective rooting depth is 42 inches or more. Depth to bedrock is more than 42 inches.

The soils of this unit are well suited to corn, soybeans, and vegetable crops. They are also well suited to such pasture and hay crops as tall fescue, timothy, orchard grass, alfalfa, red clover, and annual and sericea lespedeza.

Overflow is the main hazard, and it occurs mostly late in winter or early in spring. Under a high level of management, row crops can be grown year after year, but production is likely to be reduced during dry periods.

CAPABILITY UNIT I–3

This capability unit consists of nearly level, moderately well drained soils on flood plains. These soils have a surface layer of very friable silt loam. Their subsoil is silt loam. The effective rooting depth is 48 inches or more. Depth to bedrock is more than 60 inches.

The soils of this unit are well suited to corn and soybeans. They are also well suited to such pasture and hay crops as Kentucky bluegrass, timothy, tall fescue, orchard grass, red and ladino clover, and annual and sericea lespedeza.

Overflow is the main hazard, and it occurs mostly late in winter or early in spring. Artificial drainage improves the growth of some crops during wet seasons. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT I–4

The only soil in this capability unit is Whitley silt loam, terrace, 0 to 2 percent slopes. This soil has a surface layer of very friable silt loam. Its subsoil is silty clay loam. The effective rooting depth is 48 inches or more. Depth to bedrock is more than 48 inches.

This soil is well suited to corn, soybeans, and small grain. It is also well suited to such pasture and hay crops as Kentucky bluegrass, tall fescue, timothy, orchard grass, alfalfa, red and ladino clover, and annual and sericea lespedeza.

Overflow is the main hazard, but it is infrequent and occurs mostly late in winter or early in spring. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT IIe–1

This capability unit consists of gently sloping, well drained soils on uplands and stream terraces. These soils have a surface layer of very friable loam or silt loam. Their subsoil is clay loam or silty clay loam. The effective rooting depth is 42 inches or more. Depth to bedrock is more than 42 inches.

The soils of this unit are well suited to corn, soybeans, small grain, and tobacco. They are also well suited to such pasture and hay crops as tall fescue, orchard grass, red and ladino clover, and annual and sericea lespedeza.

Erosion is the main hazard if these soils are culti-

vated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIe-2

This capability unit consists of gently sloping, well drained soils on uplands. These soils have a surface layer of very friable silt loam or cherty silt loam. Their subsoil is silty clay loam, cherty silty clay loam, or silty clay. The effective rooting depth is 60 inches or more. Depth to bedrock is more than 60 inches.

The soils of this unit are well suited to corn, soybeans, small grain, and tobacco. They are also well suited to such pasture and hay crops as Kentucky bluegrass, tall fescue, orchard grass, alfalfa, red and ladino clover, and annual and sericea lespedeza.

Erosion is the main hazard if these soils are cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways. Some areas of these soils have karst topography, which makes erosion control difficult.

CAPABILITY UNIT IIe-3

The only soil in this capability unit is Latham silt loam, 2 to 6 percent slopes. This soil has a surface layer of friable silt loam. Its subsoil is silty clay. The effective rooting depth and the depth to soft shale are 20 to 40 inches. Depth to hard shale is more than 48 inches.

This soil is well suited to corn, soybeans, small grain, and tobacco. It is also well suited to such pasture and hay crops as Kentucky bluegrass, tall fescue, orchard grass, red and ladino clover, and annual and sericea lespedeza.

Erosion is the main hazard if this soil is cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIe-4

This capability unit consists of nearly level to gently sloping, moderately well drained soils on uplands, stream terraces, toe slopes, and fans. These soils have a surface layer of very friable silt loam or loam. Their subsoil is silt loam, clay loam, or silty clay loam. The effective rooting depth is 20 to 48 inches or more. Depth to bedrock is more than 42 inches.

The soils of this unit are well suited to corn, soybeans, and small grain. They are also well suited to such pasture and hay crops as tall fescue, orchard grass, red and ladino clover, and annual and sericea lespedeza.

Erosion is the main hazard in cultivated areas if slopes are more than 2 percent. Overflow is a hazard in some low areas adjacent to streams. The steepness and length of slopes and practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways. In areas where slopes are less than 2 percent, artificial drainage improves the growth of some crops during wet seasons.

CAPABILITY UNIT IIe-5

The only soil in this capability unit is Lily loam, 2 to 6 percent slopes. This soil has a surface layer of very friable loam. Its subsoil is clay loam. Depth to bedrock and effective rooting depth are 20 to 40 inches.

This soil is well suited to corn, soybeans, tobacco, and small grain. It is also well suited to such pasture and hay crops as tall fescue, orchard grass, red clover, and annual and sericea lespedeza.

Erosion is the main hazard if this soil is cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIw-1

This capability unit consists of nearly level, somewhat poorly drained soils on flood plains and stream terraces. These soils have a surface layer of very friable silt loam or fine sandy loam and a subsoil of silt loam or fine sandy loam. In some areas the surface layer is gravelly, and in places the subsoil is also gravelly. The effective rooting depth is limited by a seasonal high water table. Depth to bedrock is more than 42 inches.

If drained, the soils of this unit are well suited to corn and soybeans. They are well suited to such pasture and hay crops as tall fescue, redtop, red and ladino clover, reed canarygrass, and annual lespedeza.

Wetness is the main hazard. Open ditches or tile drains generally improve the suitability of these soils for crops. Overflow is also a hazard in some areas, and it occurs mostly late in winter or early in spring. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT IIw-2

The only soil in this capability unit is Morehead silt loam, high base variant. This soil has a surface layer of very friable silt loam and a subsoil of silt loam. The effective rooting depth is limited by the seasonal high water table. Depth to bedrock is more than 60 inches.

If drained, this soil is well suited to corn, soybeans, and small grain. It is well suited to such pasture and hay crops as tall fescue, redtop, ladino clover, reed canarygrass, and annual lespedeza.

Wetness is the main hazard. Open ditches or tile drains generally improve the suitability of this soil

for crops. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT IIIe–1

This capability unit consists of sloping, well drained soils on uplands, toe slopes, and stream terraces. These soils have a surface layer of very friable loam or silt loam and a subsoil of clay loam or silty clay loam. In some areas the surface layer is gravelly, and in places the subsoil is also gravelly. The effective rooting depth is 42 inches or more. Depth to bedrock is more than 42 inches.

The soils of this unit are suited to corn, soybeans, small grain, and tobacco. They are well suited to such pasture and hay crops as tall fescue, orchard grass, red and ladino clover, and annual and sericea lespedeza.

The hazard of erosion is severe if these soils are cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIIe–2

This capability unit consists of sloping, well drained soils on uplands. These soils have a surface layer of very friable silt loam or cherty silt loam. Their subsoil is silty clay loam, cherty silty clay loam, or silty clay. The effective rooting depth is 60 inches or more. Depth to bedrock is more than 60 inches.

The soils of this unit are suited to corn, soybeans, small grain, and tobacco. They are well suited to such pasture and hay crops as Kentucky bluegrass, tall fescue, orchard grass, alfalfa, red and ladino clover, and annual and sericea lespedeza.

The hazard of erosion is severe if these soils are cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIIe–3

This capability unit consists of sloping, moderately well drained soils on uplands. These soils have a surface layer of friable or very friable silt loam. The subsoil is silty clay loam or silty clay. Depth to soft shale or bedrock and the effective rooting depth are 20 to 40 inches.

The soils of this unit are suited to corn, soybeans, small grain, and tobacco. They are well suited to such pasture and hay crops as Kentucky bluegrass, tall fescue, orchard grass, red and ladino clover, and annual and sericea lespedeza.

The hazard of erosion is severe if these soils are cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIIe–4

The only soil in this capability unit is Tilsit silt loam, 6 to 12 percent slopes. This soil has a surface layer of very friable silt loam. Its subsoil is silt loam. The effective rooting depth is 20 to 28 inches. Depth to bedrock is more than 42 inches.

This soil is suited to corn, soybeans, and small grain. It is well suited to such pasture and hay crops as tall fescue, orchard grass, red and ladino clover, and annual and sericea lespedeza.

The hazard of erosion is severe if this soil is cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIIe–5

This capability unit consists of sloping, well drained soils on uplands. These soils have a surface layer of very friable loam or sandy loam. The subsoil is sandy loam or clay loam. Depth to bedrock and the effective rooting depth are 20 to 40 inches.

The soils of this unit are suited to corn, soybeans, tobacco, and small grain. They are well suited to such pasture and hay crops as tall fescue, orchard grass, red clover, and annual and sericea lespedeza.

Erosion is the main hazard if these soils are cultivated. The steepness and length of slopes and the practices used to control erosion influence the kind of cropping system needed to keep soil and water losses within tolerable limits. Practices that help to control erosion and conserve moisture are contour tillage, terracing, contour stripcropping, and establishing and maintaining grassed waterways.

CAPABILITY UNIT IIIw–1

This capability unit consists of nearly level, poorly drained soils on flood plains and low terraces. These soils have a surface layer of very friable silt loam and a subsoil of silt loam. The effective rooting depth is limited by a seasonal high water table. Depth to bedrock is more than 60 inches.

If drained, these soils are well suited to corn and soybeans. They are well suited to such pasture and hay crops as tall fescue, redtop, ladino clover, reed canarygrass, and annual lespedeza.

Wetness is the main hazard. Open ditches or tile drains greatly improve the suitability of these soils for crops. Overflow is a hazard in some areas, and it occurs mostly late in winter or early in spring. Under a high level of management row crops can be grown year after year.

CAPABILITY UNIT IVe–1

This capability unit consists of sloping to moderately steep, well drained and moderately well drained soils on uplands and toe slopes. These soils have a surface layer of friable or very friable silt loam or very friable loam or fine sandy loam. In some areas the surface layer is

gravelly. The subsoil is clay loam, silty clay loam, or silty clay. In places it is gravelly. Depth to bedrock and the effective rooting depth are 20 to 48 inches or more.

These soils are suited to occasional row crops such as corn, soybeans, and tobacco, but they are better suited to small grain or hay and pasture. They are well suited to such pasture and hay crops as tall fescue, orchard grass, red clover, annual lespedeza, and sericea lespedeza.

The hazard of erosion is very severe if these soils are cultivated. A cropping system and practices that control runoff and erosion are needed in cultivated areas.

CAPABILITY UNIT IVe–2

The only soil in this capability unit is Frederick silt loam, 12 to 20 percent slopes. This soil has a surface layer of very friable silt loam. Its subsoil is silty clay. The effective rooting depth is 60 inches or more. Depth to bedrock is more than 72 inches.

This soil is suited to occasional row crops such as corn, soybeans, and tobacco, but it is better suited to small grain or hay and pasture. It is well suited to such pasture and hay crops as tall fescue, alfalfa, orchard grass, red clover, annual lespedeza, and sericea lespedeza.

The hazard of erosion is very severe if this soil is cultivated. A cropping system and practices that control runoff and erosion are needed in cultivated areas.

CAPABILITY UNIT VIe–1

This capability unit consists of moderately steep, well drained to moderately well drained, severely eroded soils on uplands. These soils have a surface layer of friable silty clay loam. Their subsoil is silty clay. Depth to bedrock and the effective rooting depth is 20 to 60 inches or more.

These soils are suited to pasture, hay, or trees, but they are generally not suited to cultivation because of the hazard of erosion. They are suited to such pasture and hay crops as tall fescue, orchard grass, red clover, annual lespedeza, and sericea lespedeza.

CAPABILITY UNIT VIe–2

This capability unit consists of steep, well drained soils on uplands. These soils have a surface layer of friable or very friable fine sandy loam or silt loam and a subsoil of sandy loam, clay loam, silty clay loam, or silty clay. In some areas the surface layer is gravelly, and in places the subsoil is also gravelly. Depth to bedrock and the effective rooting depth are 20 to 48 inches or more.

These soils are generally suited to pasture and trees. They are suited to such pasture and hay crops as tall fescue, orchard grass, red clover, annual lespedeza, and sericea lespedeza.

CAPABILITY UNIT VIs–1

This capability unit consists of sloping to steep, well drained rocky soils on uplands. These soils have a surface layer of very friable sandy loam or silt loam. The subsoil is sandy loam to silty clay. Depth to bedrock and the effective rooting depth are 20 to 60 inches or more.

These soils are suited to pasture, hay, or trees, but they are generally too rocky or steep for cultivation. They are suited to such pasture and hay crops as tall fescue, orchard grass, alfalfa, red clover, annual lespedeza, and sericea lespedeza.

CAPABILITY UNIT VIs–2

The only soil in this capability unit is Colyer silt loam, silty subsoil variant, 12 to 20 percent slopes. This soil has a surface layer of very friable silt loam. Its subsoil is silty clay loam. Depth to bedrock and the effective rooting depth are 8 to 20 inches.

This soil is suited to pasture or trees. It is suited to such pasture plants as tall fescue, annual lespedeza, and sericea lespedeza.

CAPABILITY UNIT VIIe–1

This capability unit consists of steep to very steep, well drained soils on uplands. These soils have a surface layer of very friable or friable sandy loam, fine sandy loam, or silt loam. The subsoil is loam, fine sandy loam, silty clay loam, or silty clay. In some areas the soils are rocky. Depth to bedrock and the effective rooting depth are 20 to 48 inches or more.

The soils in this unit are generally better suited to trees than to pasture, but some areas of less sloping soil can be used for limited pasture. If used for pasture, the soils in this unit are suited to such pasture plants as tall fescue and sericea lespedeza. They are also suited to wildlife habitat. Farm equipment is difficult to handle and sometimes dangerous to use.

CAPABILITY UNIT VIIs–1

This capability unit consists of steep to very steep, well drained stony or rocky soils on uplands. These soils have a surface layer of very friable sandy loam or silt loam. The subsoil is sandy loam, silt loam, or silty clay loam. Depth to bedrock and the effective rooting depth are 10 to 48 inches or more.

Because these soils are so steep and so stony or rocky, they are better suited to trees and wildlife habitat than to pasture. Farm equipment is difficult to handle and sometimes dangerous to use.

CAPABILITY UNIT VIIs–2

This capability unit consists of moderately steep to very steep rocky soils on uplands. These soils have a surface layer of very friable silt loam to firm silty clay loam. The subsoil is silty clay loam, silty clay, or clay. Depth to bedrock and the effective rooting depth are 12 to 60 inches or more. Outcroppings of rock cover about 25 percent of the surface of these soils.

Because the soils of this unit are so rocky, they are better suited to trees and wildlife habitat than to other uses.

Estimated yields

Table 2 shows estimates of yields of the principal crops grown in Laurel and Rockcastle Counties under two levels of management. The yields given are the average that can be expected over a period of several years.

Columns A show yields to be expected under average management, which is the level of fertilization treatment and management practices generally considered as the minimum that will keep the soil from deteriorating and produce sufficient crops for profit. Yields for

TABLE 2.—*Estimated average yields per acre of principle*

[Yields in columns A are those expected under an average level of management; those in columns B, under a high level of of management. Yields for tobacco are estimated only under a high level of management. Most land types and soils that are

Map symbol	Mapping unit	Corn		Wheat	
		A	B	A	B
		Bu	Bu	Bu	Bu
AlB	Allegheny loam, 2 to 6 percent slopes	80	110	30	45
AlC	Allegheny loam, 6 to 12 percent slopes	70	100	30	45
BdB	Bedford silt loam, 2 to 6 percent slopes	70	95	30	40
BgC	Berea silt loam, 6 to 12 percent slopes	65	90	25	35
BgD	Berea silt loam, 12 to 20 percent slopes	55	80	20	30
Bn	Bonnie silt loam	50	100	20	40
Bo	Bonnie silt loam, terrace	40	80	15	35
BtB	Britwater cherty silt loam, 2 to 6 percent slopes	80	110	35	45
BtC	Britwater cherty silt loam, 6 to 12 percent slopes	65	95	30	40
BxF	Brookside-Faywood-Rock outcrop complex, 30 to 65 percent slopes				
CcD	Caneyville-Hagerstown rocky silt loams, 6 to 20 percent slopes				
CcE	Caneyville-Hagerstown rocky silt loams, 20 to 30 percent slopes				
CdD	Caneyville-Shelocta rocky silt loams, 6 to 20 percent slopes				
CdE	Caneyville-Shelocta rocky silt loams, 20 to 30 percent slopes				
Cf	Chagrin loam				
ClD	Colyer silt loam, silty subsoil variant, 12 to 20 percent slopes	85	120	35	50
Co	Cotaco loam	65	90	30	40
CsB	Crider silt loam, 2 to 6 percent slopes	85	115	35	45
CsC	Crider silt loam, 6 to 12 percent slopes	75	105	30	45
Cu	Cuba silt loam	85	120	35	50
DoF	Donahue rocky sandy loam, 40 to 75 percent slopes				
FcD	Faywood-Opequon-Rock outcrop complex, 12 to 30 percent slopes				
FdB	Frederick silt loam, 2 to 6 percent slopes	80	105	30	45
FdC	Frederick silt loam, 6 to 12 percent slopes	65	95	25	40
FdD	Frederick silt loam, 12 to 20 percent slopes	55	80	20	35
FhD3	Frederick silty clay loam, 12 to 20 percent slopes, severely eroded				
JlF	Jefferson-Latham complex, 25 to 40 percent slopes				
LbB	Latham silt loam, 2 to 6 percent slopes	75	100	30	45
LbC	Latham silt loam, 6 to 12 percent slopes	70	90	30	45
LbD	Latham silt loam, 12 to 20 percent slopes	55	80	25	35
LdD3	Latham silty clay loam, 12 to 20 percent slopes, severely eroded				
LhD	Latham-Lily complex, 6 to 20 percent slopes	55	80	20	35
LlB	Lily loam, 2 to 6 percent slopes	70	100	30	45
LlC	Lily loam, 6 to 12 percent slopes	65	95	25	40
LsD	Lily fine sandy loam, 12 to 20 percent slopes	55	80	20	35
LtE	Lily and Steinsburg fine sandy loams, 20 to 30 percent slopes				
Lv	Lindside silt loam	85	120	30	50
Mo	Morehead silt loam	65	90	30	40
Mv	Morehead silt loam, high base variant	55	80	20	35
Nd	Newark silt loam	70	100	25	35
Ng	Newark gravelly silt loam, gravelly variant	65	90	25	35
No	Nolin silt loam	85	120	35	50
Po	Pope fine sandy loam	80	115	35	50
RgF	Rigley stony fine sandy loam, 30 to 60 percent slopes				
SbC	Shelocta gravelly silt loam, 6 to 12 percent slopes	65	90	30	40
SbD	Shelocta gravelly silt loam, 12 to 20 percent slopes	50	75	25	35
SbE	Shelocta gravelly silt loam, 20 to 30 percent slopes				
ScF	Shelocta stony silt loam, 30 to 50 percent slopes				
SdD	Shelocta-Latham silt loams, 12 to 20 percent slopes	50	75	20	30
SdE	Shelocta-Latham silt loams, 20 to 30 percent slopes				
SdF	Shelocta-Latham silt loams, 30 to 50 percent slopes				
SgE	Shelocta-Rigley complex, 20 to 30 percent slopes				
SgF	Shelocta-Rigley complex, 30 to 50 percent slopes				
Sh	Steff silt loam	85	120	30	40
SkC	Steinsburg sandy loam, 6 to 12 percent slopes	55	80	25	35
SlD	Steinsburg rocky sandy loam, 12 to 20 percent slopes				
SlF	Steinsburg rocky sandy loam, 20 to 50 percent slopes				

crops grown under two levels of management

management. Absence of a yield figure indicates that the crop is seldom, if ever, grown on the soil at the specified level severely limited by slope, stoniness, or severe erosion are not suitable for crops or pasture and yields have been omitted]

Tobacco	Alfalfa and grass		Red clover and grass		Annual lespedeza and grass [1]		Pasture [2]	
B	A	B	A	B	A	B	A	B
Lbs	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow acre days* [3]	*Cow acre days* [3]
2,800	3.0	4.0	2.0	3.0	2.0	3.0	175	230
2,750	3.0	4.0	2.0	3.0	2.0	3.0	175	230
2,700	2.5	3.5	2.0	2.5	2.0	2.5	150	210
2,400	3.0	3.5	2.0	2.5	2.0	2.5	150	210
2,300	2.5	3.0	2.0	2.5	2.0	2.5	135	190
2,525			2.0	3.0	2.0	3.0	130	195
2,525			1.0	2.0	1.5	2.0	120	180
3,000	4.0	4.5	2.5	3.5	2.0	3.0	175	230
2,800	3.0	4.0	2.0	3.0	2.0	2.5	150	230
	2.5	3.5	1.5	2.0	1.5	2.0	125	180
							60	100
	2.0	2.5	1.5	2.0	1.5	2.0	125	180
							60	100
3,000	3.5	5.0	3.0	3.5	2.5	3.5	180	240
							40	80
2,400	2.5	3.0	2.0	2.5	2.0	2.5	150	200
3,100	4.0	5.0	2.5	3.5	2.5	3.0	180	250
2,900	3.0	4.5	2.5	3.0	2.5	3.0	180	250
3,200	3.5	5.0	2.5	3.5	2.5	3.5	180	250
							35	75
3,000	4.0	4.5	2.5	3.0	2.5	3.0	175	250
2,850	3.0	4.0	2.0	2.5	2.0	2.5	170	240
2,500	2.5	3.5	1.5	2.5	1.5	2.5	150	230
			1.5	2.0	1.5	2.0	75	115
							45	85
2,800	3.0	4.0	2.0	3.0	2.0	3.0	170	230
2,750	3.0	4.0	2.0	3.0	2.0	3.0	170	230
2,300	2.5	3.5	1.5	2.5	1.5	2.5	150	200
			1.0	2.0	1.4	2.3	75	115
2,300	2.5	3.5	1.5	2.5	1.5	2.5	150	200
2,800	3.0	4.0	2.0	3.0	2.0	3.0	170	220
2,600	2.5	3.5	1.5	2.5	1.5	2.5	150	200
2,100	2.5	3.5	1.5	2.5	1.5	2.5	140	180
							75	120
2,900	3.0	4.5	2.0	3.0	2.0	3.5	180	250
2,400			2.0	2.6	2.3	2.9	170	220
			1.5	3.0	1.5	3.0	170	220
2,525			2.0	3.0	2.6	3.0	175	230
2,300			2.0	2.5	2.6	3.0	175	230
3,200	3.5	5.0	3.0	4.0	2.5	3.5	180	250
3,000	3.5	5.0	3.0	4.0	2.5	3.5	180	250
2,400	3.0	4.0	2.0	3.0	2.3	3.0	165	220
2,000	2.5	3.5	1.5	2.5	2.0	3.0	125	200
							65	130
2,000	2.5	3.5	1.5	2.5	1.5	2.5	165	200
							65	130
							45	85
							65	130
							45	85
2,900	3.0	4.0	2.5	3.0	2.5	3.0	175	250
1,800	2.0	3.0	1.5	2.5	2.0	2.5	130	180
							50	85

TABLE 2.—*Estimated average yields per acre of principal*

Map symbol	Mapping unit	Corn		Wheat	
		A	B	A	B
		Bu	*Bu*	*Bu*	*Bu*
Sn	Stendal silt loam	70	100	25	35
So	Stendal silt loam, terrace	50	80	20	35
Ss	Stendal fine sandy loam, sandy variant	60	90	20	35
St	Strip mines				
TlB	Tilsit silt loam, 2 to 6 percent slopes	65	90	30	40
TlC	Tilsit silt loam, 6 to 12 percent slopes	60	80	25	35
WcF	Weikert channery silt loam, 40 to 80 percent slopes				
WhB	Whitley silt loam, 2 to 6 percent slopes	75	100	30	45
WhC	Whitley silt loam, 6 to 12 percent slopes	70	90	30	45
WhD	Whitley silt loam, 12 to 20 percent slopes	55	80	25	35
WtA	Whitley silt loam, terrace, 0 to 2 percent slopes	85	120	35	50
WtB	Whitley silt loam, terrace, 2 to 6 percent slopes	85	110	30	45
WtC	Whitley silt loam, terrace, 6 to 12 percent slopes	70	90	30	45

[1] Korean or Kobe lespedeza with grass.
[2] Pasture yields are for tall fescue and a legume.

tobacco under an average level of management are not given because a high level of management is nearly always used for this crop.

Yields given in columns B are those to be expected under a high level of management. They are not considered the maximum yields, but they are the ones that many farmers will find practical to reach if they apply the proper practices. These yields are those that result under the highest sustained production that is economically feasible.

High level management of cultivated crops consists of providing surface and internal drainage to maintain optimum plowing conditions where natural drainage is restricted; applying lime, phosphate, potash, nitrogen, and other elements according to crop needs and the needs indicated by soil tests; returning all crop residue to the soil; supplying organic matter by growing cover crops and by applying manure or other organic material where low residue crops are grown; limiting the size of the areas for seedbed preparation to the amount needed for crop production; adequately controlling weeds and insects; considering crop variety, seed quality, and plant population for a specified soil and location; keeping erosion within tolerable limits; and using timely field operations.

High level management of hay and pasture grasses consists of providing surface and internal drainage to maintain optimum growing conditions, applying lime and fertilizer at seeding time according to crop needs indicated by soil tests and applying them as topdressing as needed, reseeding and reestablishing stands regularly, planting high quality grass and legume stands and choosing crop varieties considered for a specified soil and location, using timely hay making operations, and deferring grazing and rotating livestock as needed.

The failure to adequately apply one or more of the listed items for a high level of management can cause production levels to drop, resulting in loss of profit and some permanent damage to the soils.

Use of Soils for Woodland [3]

In this subsection the woodland of Laurel and Rockcastle Counties is described, and woodland suitability groupings of the soils are explained. The potential of woodland suitability groups for producing woodcrops, limitations for management, tree species to favor in existing stands, and tree species suitable for planting are presented in table 3.

Pioneers in Laurel and Rockcastle Counties in the eighteenth century found the area covered by a virgin mixed forest that had a well balanced moisture supply. Twenty or twenty-five tree species were dominant, including yellow-poplar, sugar maple, beech, basswood, shagbark hickory, hemlock, black walnut, yellow buckeye, and chestnut.

Settlers found that this forest hindered travel, farming, and building, and large scale clearing took place. Commercial lumbering grew in importance and volume, and by 1900 it had reached large proportions. Today about 50 percent of Laurel County and 65 percent of Rockcastle County are wooded.

Following man's disturbance of the environment, the forest no longer had its original composition (*3*). Logging, land clearing, and farming practices have removed soil material in places and left the soils generally drier and poorer than they were originally. Today the dominant timber is southern pine, oak-pine, and oak-hickory types on drier, well drained ridgetops and south- and west-facing slopes; the central mixed hardwood type on north- and east-facing slopes; and the elm-ash-cottonwood type on stream terraces and bottom lands.

As a result of past treatment, only 45 percent of the woodland is well stocked with merchantable or potentially merchantable trees. About 50 cubic feet of wood per acre are grown in a year, but most sites are capable

[3] CHARLES A. FOSTER, woodland conservationist, Soil Conservation Service, helped prepare this section.

crops grown under two levels of management—Continued

Tobacco	Alfalfa and grass		Red clover and grass		Annual lespedeza and grass [1]		Pasture [2]	
B	A	B	A	B	A	B	A	B
Lbs	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow acre days* [3]	*Cow acre days* [3]
2,525			2.0	3.0	2.5	3.5	175	230
2,525			1.5	2.5	2.0	2.5	160	200
2,525			2.0	3.0	2.3	3.5	170	220
2,400	2.0	3.0	2.0	2.6	2.5	3.5	150	230
2,300	1.5	2.5	1.5	2.0	2.0	3.0	140	200
2,800	3.0	4.0	2.0	3.0	2.0	3.0	175	230
2,750	3.0	4.0	2.0	3.0	2.0	3.0	175	230
2,300	2.5	3.5	2.0	2.5	2.0	3.0	125	200
3,200	3.5	5.0	2.5	3.5	2.5	3.5	175	230
3,100	4.0	5.5	3.0	4.0	2.5	3.5	175	250
2,750	3.0	4.0	2.0	3.0	2.0	3.0	175	230

[3] Cow-acre days is the number of calendar days during a year that an acre can be grazed by an animal unit (mature cow, horse, steer, five hogs, or seven sheep) without injury to the pasture.

of producing 85 cubic feet if stocking and tree quality are improved.

Today some 23 commercial sawmills, pallet and bolt mills, and timber contractors are active in the two counties. Most of the timber harvested is shipped out of the state to secondary wood-using plants in adjacent states.

As previously stated, most sites have the potential to produce more wood and better quality trees than now exist, but better management of the woodland is needed to reach this potential. Such management should be related to soil interpretations that consider soil characteristics affecting tree growth. Examples are available water capacity, effective rooting depth, aeration, texture, drainage, aspect, and fertility.

The soils of Laurel and Rockcastle Counties have been placed in woodland suitability groups to assist owners in planning the use of their soils for wood crops. Each group is made up of soils that are suited to the same kinds of trees, that need about the same management where the vegetation on them is similar, and that have the same potential productivity.

Each woodland suitability group is identified by a three part symbol, such as 1o1, 2w1, or 3c2. The potential productivity of the soils in the group is indicated by the first number in the symbol: 1, very high; 2, high; 3, moderate; 4, low; and 5, very low. These ratings are based on field determination of average site index. Site index of a given soil is the height, in feet, that the dominant and codominant trees reach in a natural, essentially unmanaged stand in 50 years. Site index can be converted into approximate expected growth and yield per acre in cords and board feet. In this soil survey the conversion of average site index into volumetric growth and yield are based on research of upland oak (*7*), yellow-poplar (*5*), sweetgum (*4*), shortleaf pine (*8*), and Virginia pine (*6*).

The second part of the symbol identifying a woodland suitability group is a lowercase letter. In this survey the letters *w*, *c*, *x*, *d*, *r*, and *o* are used. Except for the *o*, this letter indicates an important soil property that imposes a hazard or limitation in managing the soils of the group for trees. The letter *o* means that the soils have few limitations to restrict their use for trees, and the letter *w* that excessive wetness exists, either seasonal or all year. The soils in the *w* category have restricted drainage, have a high water table, or are subject to flooding. The letter *c* indicates that the main limitation is the kind or amount of clay in the upper part of the soil profile, and the letter *x* that the main limitation is stoniness or rockiness. The letter *d* signifies that the main limitation is shallowness of the soil to hard rock. The letter *r* signifies that the main limitation is steep slopes, and thus a hazard of erosion and possible limitations to use of equipment exist. In these counties, *r* is used if slopes are greater than 20 percent and slope is the main limitation.

The last part of the symbol, another number, indicates differences between woodland suitability groups that have identical first and second parts in their identifying symbol. Soils in woodland group 1w1, for example, require somewhat different management from soils in group 1w2.

In table 3 each woodland suitability group in the county is rated for various management hazards or limitations. These ratings are *slight, moderate,* or *severe.* They are described in the following paragraphs.

Equipment limitations depend on soil characteristics that restrict or prohibit the use of harvesting equipment, either seasonally or continually. *Slight* means no restrictions in the kind of equipment or time of year it is used; *moderate* means that use of equipment is restricted for 3 months of the year or less: *severe* means that special equipment is needed and that its use is severely restricted for more than 3 months of the year.

Seedling mortality refers to the expected loss of naturally occurring or planted tree seedlings. This mor-

TABLE 3.—*Suitability of*

[Strip mines (St) are too variable to be rated other

Woodland suitability group, soil description, and map symbols	Potential productivity		
	Species	Site index	Average annual growth
			Fbm per acre
Group 1o1: Well drained soils on bottom lands. Cf, Cu, No, Po.	Upland oaks	[1] >85	>350
	Yellow-poplar	104–110	590–660
	Virginia pine	85	650
Group 1o2: Well drained, gently sloping to moderately steep soils on uplands and toe slopes. CsB, CsC, SbC, SbD, SdD[2].	Upland oaks	67–89	170–390
	Yellow-poplar	92–108	460–640
	Virginia pine	78	570
Group 1r1: Moderately well drained and well drained, steep and very steep soils on uplands and toe slopes that have north- and east-facing slopes. JlF[3], SbE, ScF, SdE[2], SdF[2], SgE, SgF.	Yellow-poplar	93–107	470–630
	Virginia pine	78	570
	Shortleaf pine	74–78	650–710
Group 1w1: Moderately well drained and somewhat poorly drained, nearly level soils on bottom lands and terraces. Lv, Nd, Ng, Sh, Sn, So, Ss.	Upland oaks	[1] >85	>350
	Yellow-poplar	94	480
	Sweetgum	[1] >95	>500
Group 1w2: Poorly drained, nearly level soils. Bn, Bo.	Yellow-poplar	96	510
	Sweetgum	[1] >95	>490
Group 2o1: Well drained, gently sloping to moderately steep soils on uplands and terraces. AlB, AlC, BtB, BtC, LlB, LlC, LsD, WhB, WhC, WhD, WtA, WtB, WtC.	Virginia pine	68–74	480–530
	Yellow-poplar	80–88	330–420
	Upland oaks	64–82	150–310
	Shortleaf pine	59–69	470–590
Group 2r1: Moderately well drained and well drained, steep and very steep soils on toe slopes that have west- and south-facing slopes. JlF[3], SbE, ScF, SdE[2], SdF[2], SgE, SgF.	Upland oaks	62–74	130–230
	Yellow-poplar	[1] 85–95	380–490
	Virginia pine	69–79	490–580
Group 2c1: Well drained, gently sloping to moderately steep soils that have a mostly clayey subsoil. CdD, FdB, FdC, FdD.	Upland oaks	[1] 75–85	240–350
	Virginia pine	74	530
Group 2w1: Moderately well drained to somewhat poorly drained, nearly level to gently sloping soils on uplands and terraces. Co, Mo, Mv.	Upland oaks	92	420
	Yellow-poplar	87–97	410–520
	Virginia pine	75	540
	Shortleaf pine	84	800
Group 2x1: Well drained, moderately steep to very steep, rocky soils that have north- and east-facing slopes. BxF, DoF, FcD, RgF.	Yellow-poplar	94–106	480–610
	Upland oaks	80	290
Group 3o1: Well drained, sloping and moderately steep soils that are sandy. SkC, SlD.	Shortleaf pine	58	460
Group 3r1: Well drained, steep and very steep soils that are sandy or loamy. LtE, SlF.	Upland oaks	71	200
	Virginia pine	67	470

the soils for trees

than by onsite examination; > means more than]

Management problems					Species to favor—	
Erosion hazard	Equipment limitations	Seedling mortality	Plant competition		In existing stands	For planting
			Conifers	Hardwoods		
Slight	Slight	Slight	Severe	Severe	Yellow-poplar, black walnut, white ash, pin oak, sweetgum, sycamore.	Black walnut, yellow-poplar, white ash, sweetgum, northern red oak, loblolly pine, shortleaf pine, cottonwood, white pine.
Slight	Slight	Slight	Severe	Moderate	Yellow-poplar, black walnut, white ash, white oak, southern red oak, northern red oak, black oak, hickory, scarlet oak, Virginia pine.	Yellow-poplar, black walnut, white ash, northern red oak, loblolly pine, shortleaf pine, white pine, black locust.
Slight to moderate.	Moderate to severe.	Slight	Severe	Moderate	Yellow-poplar, northern red oak, Virginia pine, white oak, black oak, basswood, white ash, beech, chestnut oak.	Yellow-poplar, white ash, black walnut, white oak, white pine, shortleaf pine, loblolly pine, Virginia pine, black locust.
Slight	Moderate	Slight	Severe	Severe	Yellow-poplar, white oak, river birch, white ash, sycamore, black walnut, black oak, red maple.	Yellow-poplar, sweetgum, sycamore, loblolly pine, pin oak.
Slight	Severe	Severe	Severe	Severe	Yellow-poplar, sweetgum, sycamore, red maple, river birch, pin oak.	Sweetgum, sycamore, loblolly pine, pin oak.
Slight	Slight	Slight	Severe	Moderate	Yellow-poplar, black oak, white oak, Virginia pine, shortleaf pine, sweetgum, scarlet oak, hickory, black cherry, beech.	Yellow-poplar, white pine, shortleaf pine, black walnut, white ash, Virginia pine, loblolly pine, black locust.
Moderate	Moderate to severe.	Slight	Severe	Moderate	Yellow-poplar, white oak, northern red oak, chestnut oak, Virginia pine, shortleaf pine, beech, black oak, scarlet oak.	White pine, shortleaf pine, northern red oak, loblolly pine, Virginia pine.
Slight to moderate.	Moderate	Slight	Severe	Moderate	Virginia pine, redcedar, northern red oak, black oak, white oak, yellow-poplar, hickory, black cherry.	Yellow-poplar, white ash, black walnut, northern red oak, Virginia pine, shortleaf pine, white pine, black locust, loblolly pine.
Slight	Moderate	Slight	Severe	Moderate	Yellow-poplar, Virginia pine, black walnut, white oak, black oak, sweetgum, white ash, pitch pine, shortleaf pine.	Sweetgum, sycamore, loblolly pine, pin oak, yellow-poplar.
Severe	Severe	Slight	Severe	Moderate	Yellow-poplar, Virginia pine, black walnut, basswood, northern red oak, shortleaf pine.	Yellow-poplar, white pine, shortleaf pine, Virginia pine, black walnut, white ash.
Slight	Slight	Slight	Moderate	Slight	Shortleaf pine, Virginia pine, scarlet oak, white oak, hickory.	Shortleaf pine, Virginia pine, white pine.
Slight to moderate.	Moderate to severe.	Slight	Moderate	Slight	White oak, black oak, post oak, hickory, Virginia pine, American beech, scarlet oak, pitch pine.	Shortleaf pine, loblolly pine, Virginia pine.

TABLE 3.—*Suitability of*

Woodland suitability group, soil description, and map symbols	Potential productivity		
	Species	Site index	Average annual growth
			Fbm per acre
Group 3c1: Moderately well drained and well drained, gently sloping to moderately steep soils that are mostly clayey in the subsoil. CcD, FhD3, LbB, LbC, LbD, LhD.	Upland oaks Shortleaf pine	63 72	140 625
Group 3c2: Well drained, steep, rocky soils that are mostly clayey in the subsoil. CcE[4], CdE[4].	Upland oaks Virginia pine	[1] 65–75 [1] 65–75	150–240 450–540
Group 3w1: Moderately well drained, gently sloping to moderately steep soils. BdB, BgC, BgD, TlB, TlC.	Upland oaks Yellow-poplar Shortleaf pine	69–75 87–101 69–81	190–240 400–560 590–670
Group 3x1: Well drained, moderately steep to very steep, rocky soils that have west- and south-facing slopes. BxF, DoF, FcD, RgF.	Upland oaks Virginia pine	66 73	160 520
Group 4c1: Moderately steep, eroded clay soil. LdD3.	Upland oaks Virginia pine	[1] 55–65 [1] 55–65	90–150 370–450
Group 4d1: Shallow, moderately steep soils. ClD.	Upland oaks Virginia pine	[1] 55–65 [1] 55–65	90–150 370–450
Group 4d2: Shallow, very steep, rocky soils that have north- and east-facing slopes. WcF.	Upland oaks Yellow-poplar Shortleaf pine	71–79 89 64	200–280 430 530
Group 5d1: Shallow, very steep, rocky soils that have west- and south-facing slopes. WcF.	Upland oaks Virginia pine Shortleaf pine	54–66 51–61 55	85–160 340–420 420

[1] Productivity rating is based on an estimate.
[2] Latham in complex with Shelocta has a lower site index rating.

tality is influenced by kinds of soils or topographic conditions. Plant competition is assumed not to be a factor. *Slight* means a loss of 0 to 25 percent of the seedlings, *moderate* means a loss of 25 to 50 percent, and *severe* means a loss of more than 50 percent. It is assumed that seed supplies are adequate.

Plant competition is the degree to which undesirable plants invade openings in the tree canopy. Considered in the ratings are available water capacity, fertility, drainage, and degree of erosion. Conifers and hardwoods are rated separately in table 3. *Slight* means that plant competition does not prevent adequate natural regeneration and early growth or interfere with seedling development; *moderate* means that competition delays natural or artificial establishment and growth rate, but it does not prevent the development of fully stocked normal stands; *severe* means that competition prevents adequate natural or artificial regeneration unless the site is prepared properly and such maintenance practices as burning, spraying, disking, or girdling are used.

Listed in table 3 are suitable species to favor in existing stands and suitable species for planting. The estimated site index in table 3 is the height in feet that the tallest trees reach at 50 years of age on the soils in each group.

Use of Soils for Wildlife Habitat

The welfare of a wildlife species depends largely on the amount and distribution of food, shelter, and water. If any of these elements is missing, inadequate, or inaccessible, the species is either absent or scarce. The kinds of wildlife that live in a given area and the number of each kind are closely related to land use, to the resulting kinds and patterns of vegetation, and to

the soils for trees—Continued

Management problems					Species to favor—	
Erosion hazard	Equipment limitations	Seedling mortality	Plant competition		In existing stands	For planting
			Conifers	Hardwoods		
Slight to moderate.	Moderate	Slight	Moderate	Slight	White oak, black oak, shortleaf pine, Virginia pine, northern red oak, chestnut oak.	White pine, Virginia pine, shortleaf pine, loblolly pine, black locust.
Severe	Severe	Slight	Moderate	Slight	White oak, northern red oak, hickory, Virginia pine, yellow-poplar, black locust.	Virginia pine, shortleaf pine, redcedar, black locust, white pine.
Slight	Moderate	Slight	Moderate	Slight	Yellow-poplar, southern red oak, sweetgum, white oak, sycamore, hickory, beech, black oak.	Sweetgum, loblolly pine, sycamore, yellow-poplar, white ash.
Moderate to severe.	Moderate to severe.	Slight	Moderate	Slight	Yellow-poplar, northern red oak, white oak, black oak, Virginia pine, beech, hickory.	White pine, shortleaf pine, Virginia pine, northern red oak, loblolly pine.
Moderate	Moderate	Moderate	Slight	Slight	Virginia pine, shortleaf pine, white oak, black oak, hickory.	Virginia pine, shortleaf pine, loblolly pine.
Slight	Slight	Severe	Slight	Slight	Virginia pine, pitch pine, scarlet oak, black oak, hickory, white oak, chestnut oak.	Virginia pine, shortleaf pine, loblolly pine, redcedar.
Moderate	Severe	Severe	Slight	Slight	Yellow-poplar, white oak, Virginia pine, beech, black oak, hickory.	White pine, Virginia pine, shortleaf pine, loblolly pine, redcedar.
Moderate	Severe	Severe	Slight	Slight	Post oak, scarlet oak, chestnut oak, black oak, hickory, pitch pine, Virginia pine.	Virginia pine, shortleaf pine, loblolly pine, redcedar.

[3] Latham in complex with Jefferson has a lower site index rating.
[4] Shelocta in complex with Caneyville has a higher site index rating.

the supply and distribution of water. These, in turn, are generally related to the kinds of soils.

Habitat for wildlife generally can be created or improved by planting suitable vegetation, by properly managing the existing plant cover, by fostering the natural establishment of desirable plants, or by using a combination of these measures.

In this section the soils of Laurel and Rockcastle Counties are rated according to their suitability for seven elements of wildlife habitat and for three kinds of wildlife. The elements and the general kinds of wildlife are described and the ratings are explained.

Uses of suitability ratings

The suitability ratings in this section can be used as an aid in:

1. Planning the broad use of parks, refuges, nature study areas, and other recreational developments for wildlife habitat.
2. Selecting the most suitable soils for creating, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative intensity of management needed for individual elements of wildlife habitat.
4. Eliminating sites that would be difficult or impractical to manage for specific kinds of wildlife.
5. Determining areas that are suitable for acquisition for use by wildlife.

Habitat elements

Each soil is rated in table 4 according to its suitability for various kinds of plants and other elements that make up wildlife habitat. The seven elements considered important are as follows:

TABLE 4.—*Suitability of the soils for elements*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil to another series listed in the first column of this table. Soils rated *good* are well suited or above average; *fair*, suited or average; too variable

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood trees
Allegheny:				
AlB	Good	Good	Good	Good
AlC	Fair	Good	Good	Good
Bedford: BdB	Fair	Good	Good	Fair
Berea: BgC, BgD	Fair	Good	Good	Fair
Bonnie: Bn, Bo	Poor	Fair	Fair	Fair
Britwater:				
BtB	Good	Good	Good	Good
BtC	Fair	Good	Good	Good
*Brookside: BxF For Faywood part, see Faywood series; for Rock outcrop part, see Rock outcrop.	Very poor	Very poor	Good	Good
*Caneyville: CcD, CcE, CdD, CdE For Hagerstown part of CcD and CcE, see Hagerstown series; for Shelocta part of CdD and CdE, see Shelocta series.	Poor	Fair	Good	Fair
Chagrin: Cf	Good	Good	Good	Good
Colyer: ClD	Poor	Fair	Fair	Poor
Cotaco: Co	Good	Good	Good	Good
Crider:				
CsB	Good	Good	Good	Good
CsC	Fair	Good	Good	Good
Cuba: Cu	Good	Good	Good	Good
Donahue: DoF	Very poor	Poor	Good	Fair
*Faywood: FcD For Opequon part, see Opequon series; for Rock outcrop part, see Rock outcrop.	Very poor	Very poor	Good	Fair
Frederick:				
FdB	Good	Good	Good	Good
FdC	Fair	Good	Good	Good
FdD	Fair	Good	Good	Good
FhD3	Fair	Good	Good	Good
Hagerstown: Mapped only in complex with Caneyville soils.	Poor	Fair	Good	Good
*Jefferson: JlF For Latham part, see Latham series.	Very poor	Poor	Good	Good
*Latham:				
LbB	Fair	Good	Good	Fair
LbC, LbD, LdD3, LhD	Fair	Good	Good	Fair
Latham part of JlF	Very poor	Poor	Good	Fair
Latham part of SdD	Fair	Good	Good	Fair
Latham part of SdE	Poor	Fair	Good	Fair
Latham part of SdF For Lily part of LhD, see unit LsD in Lily series.	Very poor	Poor	Good	Fair

of wildlife habitat and for kinds of wildlife

that may have different suitabilities for wildlife. For this reason the reader should follow carefully the instructions for referring *poor*, poorly suited or below average; and *very poor*, use not feasible. Strip mines (St) are not included because their properties are to rate]

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow water areas	Open land	Woodland	Wetland
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Good	Good	Very poor.
Fair	Good	Fair	Fair	Fair	Fair.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Poor	Very poor	Very poor	Fair	Poor	Very poor.
Good	Poor	Poor	Good	Good	Poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.

TABLE 4.—*Suitability of the soils for elements*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood trees
*Lily:				
LlB	Fair	Good	Good	Fair
LlC, LsD	Fair	Good	Good	Fair
LtE	Poor	Fair	Good	Fair
For Steinsburg part of LtE, see units SkC and SlD in Steinburg series.				
Lindside: Lv	Good	Good	Good	Good
Morehead:				
Mo	Good	Good	Good	Good
Mv	Fair	Good	Good	Good
Newark:				
Nd	Fair	Good	Good	Good
Ng	Fair	Good	Good	Fair
Nolin: No	Good	Good	Good	Good
Opequon:	Very poor	Very poor	Fair	Poor
Mapped only in complex with Faywood soils.				
Pope: Po	Fair	Good	Good	Fair
Rigley:				
RgF	Very poor	Very poor	Good	Fair
Rigley part of SgE	Poor	Fair	Good	Fair
Rigley part of SgF	Very poor	Poor	Good	Fair
Rock outcrop:	Very poor	Very poor	Very poor	Very poor
Mapped in complex with Brookside and Faywood soils.				
*Shelocta:				
SbC, SbD, SdD	Fair	Good	Good	Good
SbE, SdE	Poor	Fair	Good	Good
ScF	Very poor	Very poor	Good	Fair
SdF, SgF	Very poor	Poor	Good	Good
SgE	Poor	Fair	Good	Good
For Latham part of SdD, SdE, and SdF, see Latham series; for Rigley part of SgE and SgF, see Rigley series.				
Steff: Sh	Good	Good	Good	Good
Steinsburg:				
SkC, SlD	Poor	Fair	Fair	Poor
SlF	Very poor	Poor	Fair	Poor
Stendal:				
Sn	Fair	Good	Good	Good
So	Fair	Good	Good	Good
Ss	Fair	Good	Good	Fair
Strip mines: St.				
Too variable to rate.				
Tilsit:				
TlB	Fair	Good	Good	Fair
TlC	Fair	Good	Good	Fair
Weikert: WcF	Very poor	Poor	Poor	Very poor
Whitley:				
WhB, WtA, WtB	Good	Good	Good	Good
WhC, WhD, WtC	Fair	Good	Good	Good

of wildlife habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow water areas	Open land	Woodland	Wetland
Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Good	Poor	Poor	Good	Good	Poor.
Good	Poor	Poor	Good	Good	Poor.
Good	Fair	Poor	Good	Good	Poor.
Good	Fair	Fair	Good	Good	Fair.
Fair	Fair	Fair	Good	Fair	Fair.
Good	Poor	Very poor	Good	Good	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Very poor	Very poor	Very poor	Very poor	Very poor	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Good	Very poor	Very poor	Poor	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Poor	Good	Good	Poor.
Poor	Very poor	Very poor	Fair	Poor	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Good	Fair	Fair	Good	Good	Fair.
Good	Fair	Poor	Good	Good	Poor.
Fair	Fair	Poor	Good	Fair	Poor.
Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Good	Fair	Very poor.
Very poor	Very poor	Very poor	Poor	Very poor	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.

Grain and seed crops.—These crops include such seed producing annuals as corn, sorghum, wheat, barley, oats, millet, buckwheat, cowpeas, and other plants commonly grown for grain or seed. The major soil properties affecting this habitat element are effective rooting depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

Domestic grasses and legumes.—Making up this group are domestic perennial grasses and herbaceous legumes that are established by planting and that furnish wildlife cover and food. Among the plants are bluegrass, fescue, brome, timothy, orchardgrass, reed canarygrass, clover, and alfalfa. The major soil properties affecting this habitat element are effective rooting depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

Wild herbaceous plants.—In this group are native or introduced perennial grasses and weeds that generally are established naturally. They include bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, and dandelion. These plants provide food and cover mainly to upland forms of wildlife. The major soil properties affecting this habitat element are effective rooting depth, available water capacity, natural drainage, surface stoniness, hazard of flooding or ponding, and texture of the surface layer and subsoil.

Hardwood trees.—This element includes nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They are generally established naturally, but they may be planted. Among the native kinds are oak, cherry, maple, poplar, apple, hawthorn, dogwood, persimmon, sumac, sassafras, hazelnut, black walnut, hickory, sweetgum, bayberry, blueberry, huckleberry, blackhaw, virburnum, grape, and brier. The major soil properties affecting this habitat element are effective rooting depth, available water capacity, and natural drainage.

Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky corner dogwood are some of the shrubs that generally are available and can be planted on soils that are rated good. Hardwoods that are not available commercially can commonly be transplanted successfully.

Coniferous plants.—This element consists of cone bearing evergreen trees and shrubs that are used by wildlife primarily as cover, though they also provide browse and seeds or fruitlike cones. Among these are Norway spruce, Virginia pine, loblolly pine, shortleaf pine, pond pine, Scotch pine, redcedar, and Atlantic white-cedar. Generally these plants are established naturally in areas where the cover of weeds and sod is thin, but they may also be planted. The major soil properties affecting this habitat element are effective rooting depth, available water capacity, and natural drainage.

Wetland plants.—Making up this group are wild herbaceous, annual, and perennial plants that grow on moist to wet sites, exclusive of submerged or floating aquatics. These plants produce food and cover extensively used by wetland forms of wildlife. They include smartweed, wild millet, bulrush, sedges, barnyardgrass, pondweed, duckweed, duckmillet, arrow arum, pickerelweed, waterwillow, wetland grasses, wildrice, and cattails. The major soil properties affecting this habitat element are natural drainage, surface stoniness, slope, and texture of the surface layer and subsoil.

Shallow water areas.—These areas of shallow water are generally not more than five feet deep, near food and cover for wetland wildlife. They are either natural bodies of water or bodies created by dams or levees or water control devices in marshes or streams. Examples of such developments are wildlife ponds, beaver ponds, muskrat marshes, waterfowl feeding areas, and wildlife watering developments. The major soil properties affecting this habitat element are depth to bedrock, natural drainage, slope, surface stoniness, and permeability.

Naturally wet areas that are fed by aquifers are rated on the basis of drainage class without regard to permeability. Permeability applies only to those nonaquifer areas that have a potential for development, including available water offsite.

General kinds of wildlife habitat

In table 4 the soils are rated according to their suitability as habitat for three general kinds of wildlife—open land, woodland, and wetland.

Open land wildlife.—Examples of open land wildlife are quail, pheasant, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally make their home in areas of cropland, pasture, meadow, and lawns and in areas overgrown with grasses, herbs, shrubs, and vines.

Woodland wildlife.—Among the birds and mammals that prefer woodland are ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray and red squirrels, gray fox, white-tail deer, raccoon, and wild turkey. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants.

Wetland wildlife.—Ducks, geese, rails, herons, shore birds, and muskrat are familiar examples of birds and mammals that normally make their homes in such wet areas as ponds, marshes, and swamps.

Each rating under "Kinds of Wildlife" in table 4 is based on the ratings listed for the elements of wildlife habitat in the first part of the table. For open land wildlife the ratings are based on the ratings shown for grain and seed crops, domestic grasses and legumes, wild herbaceous plants, and either hardwood trees or coniferous plants, whichever is more applicable. The ratings for woodland wildlife are based on the ratings listed for domestic grasses and legumes, wild herbaceous plants, and either hardwood trees or coniferous plants, whichever is more applicable. For wetland wildlife the ratings are based on the ratings shown for wetland plants and shallow water areas.

On soils rated *good,* habitat is generally easily created, improved, or maintained. Few or no soil limitations to habitat management exist, and satisfactory results can be expected.

On soils rated *fair,* habitat generally can be created, improved, or maintained, but the soils have moderate limitations that affect the creation, improvement, or maintenance of the habitat. Moderately intensive man-

agement and fairly frequent attention are required for satisfactory results.

On soils rated *poor,* habitat can generally be created, improved, or maintained, but soil limitations are rather severe. Habitat management is difficult and expensive, and it requires intensive effort. Satisfactory results are questionable.

On soils rated *very poor,* it is impractical to create, improve, or maintain habitat because of the very severe soil limitations. Unsatisfactory results are probable.

Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

Engineering Uses of the Soils [4]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures that control water and conserve soil.
4. Correlate performance of structures already built with properties of the kinds of soil on which they are built to predict performance of structures on the same or similar kinds of soil in other locations.
5. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
6. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5, 6, 7, which show, respectively, several estimated soil properties significant to engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 5 and 6. It also can be used to make other useful maps.

This information, however, does not eliminate need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists that is not known to all engineers. The Glossary defines many of these terms commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*2*) used by the SCS engineers, Department of Defense, and others, and the AASHTO (*1*) system adopted by the American Association of State Highway and Transportation Officials.

In the Unified system soils are classified according to particle size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes—eight classes of coarse grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CL–ML.

The AASHTO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHTO classification for tested soils is shown in table 7; the estimated classification is given in table 5 for all soils mapped in the survey area.

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt," "clay," and other terms used in the USDA textural classification are defined in the Glossary.

Soil properties significant to engineerng

Several estimated soil properties significant to engineering are given in table 5. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of

[4] JAMES H. DICKINSON, engineer, Soil Conservation Service, assisted in the preparation of this section.

TABLE 5.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. instructions for referring to other series that appear in the first column of this table. Rock outcrop and Strip mines (St)

Soil series and map symbols	Depth to—		Depth from surface of typical profile	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified [1]	AASHTO [1]
	Feet	*Feet*	*Inches*			
Allegheny: AlB, AlC	>5	>4	0–18	Loam	ML	A–4
			18–62	Clay loam	CL–ML or CL	A–6
Bedford: BdB	>5	1½–2	0–11	Silt loam	ML or CL–ML	A–4
			11–23	Silty clay loam	CL–ML or CL	A–6
			23–45	Silty clay loam (fragipan).	CL–ML or CL	A–6
			45–65	Silty clay	CL or MH	A–6 or A–7
Berea: BgC, BgD	1½–3½	1½–2½	0–6	Silt loam	ML	A–4
			6–21	Silty clay loam	CL–ML, CL	A–6 or A–7
			21–25	Silty clay	CL or MH	A–7 or A–6
			25–36	Rippable shale.		
Bonnie: Bn, Bo	>5	[2] 0–½	0–9	Silt loam	ML	A–4
			9–60	Silt loam	ML	A–4
Britwater: BtB, BtC	>6	>6	0–10	Cherty silt loam	ML	A–4
			10–18	Cherty silt loam	ML or GM	A–4
			18–65	Cherty silty clay loam.	CL, CL–ML, or GM	A–4 or A–6
*Brookside: BxF For Faywood part, see Faywood series; Rock outcrop part too variable to estimate.	>5	>6	0–4	Silt loam	ML or CL–ML	A–6
			4–24	Silty clay loam	CL or CL–ML	A–7
			24–50	Silty clay	CL or MH	A–7
			50–72	Clay	CL or MH	A–7
*Caneyville: CcD, CcE, CdD, CdE For Hagerstown part of CcD and CcE, see Hagerstown series; for Shelocta part of CdD and CdE, see Shelocta series.	1½–3½	>6	0–6	Silt loam	ML	A–4
			6–12	Silty clay loam	CL or CL–ML	A–6
			12–32	Silty clay	CL or MH	A–7
			32–38	Clay	MH	A–7
			38	Limestone.		
Chagrin: Cf	>3½	[3] >4	0–45	Loam	ML	A–4
			45–62	Gravelly fine sandy loam.	CL, SM, or GM	A–4
Colyer: ClD	½–1½	>6	0–4	Silt loam	ML	A–4
			4–16	Silty clay loam	CL–ML, CL	A–6 or A–7
			16	Shale.		
Cotaco: Co	>3½	1½–2	0–18	Loam	ML	A–4
			18–40	Clay loam	CL	A–6 or A–7
			40–60	Loam	CL–ML, ML	A–4
Crider: CsB, CsC	>5	>6	0–10	Silt loam	ML	A–4
			10–43	Silty clay loam	CL–ML or CL	A–6 or A–7
			43–65	Silty clay loam	CL–ML or CL	A–6 or A–7
Cuba: Cu	>5	[3] >4	0–60	Silt loam	ML	A–4
Donahue: DoF	1½–3½	>6	0–12	Sandy loam	SM, ML	A–4 or A–2
			12–22	Loam	ML	A–4
			22–38	Clay	MH or CH	A–7
			38	Limestone.		

significant to engineering

Because the soils in such mapping units can have different properties and limitations, it is necessary to follow carefully the are so variable that their properties were not estimated. The symbol > means more than; the symbol < means less than]

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
Percent					*Inches per hour*	*Inches per inch of soil*	*pH*	
----------	95–100	90–100	65–75	60–70	0.6–2.0	0.15–0.18	4.5–5.5	Low.
----------	95–100	90–100	65–75	60–70	0.6–2.0	0.14–0.18	4.5–5.5	Low.
----------	----------	100	90–100	80–90	0.6–2.0	0.19–0.23	<4.5–6.5	Low.
----------	----------	100	95–100	85–95	0.6–2.0	0.18–0.22	<4.5–5.5	Moderate.
----------	----------	100	95–100	85–95	<0.06	0.09–0.11	<4.5–5.5	Moderate.
----------	95–100	90–100	80–95	75–95	0.2–0.6	0.07–0.09	<4.5–5.5	Moderate.
----------	95–100	90–100	85–95	80–90	0.6–2.0	0.16–0.19	<4.5–5.5	Low.
----------	95–100	90–100	85–95	80–90	0.6–2.0	0.15–0.18	<4.5–5.5	Low.
----------	65–90	55–85	55–80	50–75	0.2–0.6	0.10–0.12	<4.5–5.5	Moderate.
----------	----------	100	95–100	90–100	0.6–2.0	0.20–0.23	4.5–6.5	Low.
----------	----------	100	95–100	90–100	0.6–2.0	0.18–0.22	4.5–5.5	Low.
----------	75–85	65–75	60–70	55–65	0.6–2.0	0.12–0.18	5.1–6.5	Low.
----------	65–85	55–75	50–70	45–65	0.6–2.0	0.12–0.15	5.1–6.0	Low.
----------	65–85	55–75	50–70	45–65	0.6–2.0	0.09–0.11	5.1–6.0	Moderate.
0–5	85–95	75–90	70–85	65–75	0.6–2.0	0.15–0.16	5.6–7.8	Low.
0–5	85–95	75–90	70–85	65–80	0.6–2.0	0.14–0.16	5.6–7.8	Moderate.
0–5	85–95	75–90	70–85	65–80	0.2–0.6	0.12–0.14	5.6–7.8	Moderate.
0–5	85–95	70–85	65–80	60–75	0.2–0.6	0.10–0.12	5.6–7.8	Moderate.
----------	90–100	85–100	80–95	65–90	0.6–2.0	0.18–0.20	5.1–6.5	Low.
----------	90–100	85–100	80–95	75–90	0.6–2.0	0.14–0.18	5.1–5.5	Moderate.
----------	90–100	85–100	80–95	75–90	0.2–0.6	0.12–0.16	5.1–5.5	Moderate.
----------	95–100	90–100	85–100	80–90	0.2–0.6	0.09–0.12	6.1–7.8	Moderate.
----------	85–100	75–100	55–80	50–75	0.6–2.0	0.15–0.18	5.6–7.3	Low.
----------	65–100	55–100	45–80	35–75	0.6–2.0	0.10–0.14	5.6–7.3	Low.
----------	85–100	75–100	70–95	65–90	0.6–2.0	0.18–0.22	<4.5–5.5	Low.
----------	90–100	75–100	70–100	65–95	0.6–2.0	0.16–0.20	<4.5–5.5	Low.
----------	90–100	75–100	60–80	50–75	0.6–2.0	0.15–0.18	4.5–6.5	Low.
----------	90–100	75–100	65–85	55–80	0.6–2.0	0.12–0.16	4.5–5.5	Low.
----------	90–100	75–100	60–80	50–75	0.6–2.0	0.12–0.16	4.5–5.5	Low.
----------	100	95–100	90–95	80–90	0.6–2.0	0.19–0.22	5.1–6.0	Low.
----------	100	95–100	90–95	80–90	0.6–2.0	0.18–0.22	5.1–5.5	Low.
----------	95–100	90–100	85–95	75–85	0.6–2.0	0.16–0.18	5.1–5.5	Low.
----------	----------	100	90–100	80–90	0.6–2.0	0.19–0.22	4.5–5.5	Low.
0–30	95–100	90–100	30–70	20–55	2.0–6.0	0.10–0.14	4.5–5.5	Low.
0–30	100	95–100	70–80	60–75	0.6–2.0	0.14–0.18	4.5–5.5	Low.
0–30	100	100	90–100	85–95	0.2–0.6	0.12–0.14	5.6–7.3	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface of typical profile	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified [1]	AASHTO [1]
	Feet	*Feet*	*Inches*			
*Faywood: FcD For Opequon part, see Opequon series; Rock outcrop part too variable to estimate.	1½–3½	>6	0–4 4–33	Silt loam Silty clay	ML MH	A–4 A–7
Frederick: FdB, FdC, FdD, FhD3	>6	>6	0–8 8–12 12–75	Silt loam Silty clay loam Silty clay	ML or CL CL or CL–ML MH or CL	A–4 or A–6 A–7 A–7
Hagerstown Mapped only in complex with Caneyville soils.	3½–>5	>6	0–6 6–9 9–22 22–53 53	Silt loam Silty clay loam Silty clay Clay Limestone.	ML CL–ML or CL MH or CL MH or CL	A–4 A–7 A–7 A–7
*Jefferson: JlF For Latham part, see Latham series.	>4	>6	0–17 17–33 33–58 58–70	Fine sandy loam Loam Channery loam Clay	SM or ML ML ML MH or CL	A–4 or A–2 A–4 A–4 A–7
*Latham: LbB, LbC, LbD, LdD3, LhD For Lily part of LhD, see Lily series.	1½–3½	>6	0–6 6–34 34–96	Silt loam Silty clay Clay shale.	ML MH or CL	A–4 A–7
*Lily: LlB, LlC, LsD, LtE For Steinsburg part of LtE, see Steinsburg series.	1½–3½	>6	0–8 8–24 24–30 30	Loam Clay loam Sandy clay loam Sandstone.	ML or SM CL, ML, or SM SC or SM	A–4 A–4, A–6, or A–7 A–4 or A–6
Lindside: Lv	>5	[3] 1½–2	0–60	Silt loam	ML	A–4
Morehead: Mo	>4	1½–2	0–20 20–30 30–60	Silt loam Silty clay loam Silt loam	ML CL–ML, CL ML	A–4 A–6 A–4
Morehead variant: Mv	>5	½–1½	0–28 28–55 55–62	Silt loam Silty clay loam Silty clay loam	ML CL–ML, CL CL–ML, CL	A–4 A–6 A–6
Newark: Nd	>5	[3] ½–1½	0–60	Silt loam	ML	A–4
Newark variant: Ng	>3½	[3] ½–1½	0–48 48	Gravelly silt loam Shale.	ML, GM	A–4
Nolin: No	>5	[3] >4	0–60	Silt loam	ML	A–4
Opequon Mapped only in complex with Faywood soils.	1–1½	>6	0–3 3–16 16	Silty clay loam Clay Limestone.	CL–ML or CL CH or MH	A–7 A–7
Pope: Po	>4	[3] >4	0–37 37–61	Fine sandy loam Fine sandy loam	SM, ML SM, ML	A–4 or A–2 A–4 or A–2
Rigley: RgF	>4	>6	0–54 54–68	Fine sandy loam Silty clay loam	SM–SC or SM CL–ML or SM	A–1 or A–2 A–6 or A–1
*Shelocta: SbC, SbD, SbE, ScF, SdD, SdE, SdF, SgE, and SgF. For Latham part of SdD, SdE, and SdF, see Latham series; for Rigley part of SgE and SgF, see Rigley series.	>4	>6	0–15 15–20 20–45 45–62	Silt loam Silty clay loam Channery silty clay loam. Silty clay	ML, SM ML, CL, or SC–SM ML, CL, or SC–SM CL or MH	A–4 A–7, A–4, or A–6 A–6 or A–4 A–7 or A–6

significant to engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
Percent					*Inches per hour*	*Inches per inch of soil*	*pH*	
----------	80–100	75–100	70–95	60–90	0.6–2.0	0.18–0.22	5.6–7.3	Low.
----------	80–100	75–100	70–100	65–95	0.2–0.6	0.12–0.16	5.6–7.3	Moderate.
----------	95–100	90–100	80–100	75–90	0.6–2.0	0.19–0.22	4.5–6.0	Low.
----------	95–100	90–100	80–100	75–90	0.6–2.0	0.18–0.22	4.5–6.0	Low.
----------	95–100	90–100	85–100	80–95	0.6–2.0	0.14–0.18	4.5–5.5	Moderate.
----------	----------	100	90–100	80–90	0.6–2.0	0.19–0.22	5.1–6.5	Low.
----------	----------	100	90–100	85–95	0.6–2.0	0.18–0.22	5.1–6.5	Low.
----------	95–100	90–100	80–100	75–95	0.6–2.0	0.14–0.18	5.1–6.5	Moderate.
----------	100	100	90–100	85–95	0.6–2.0	0.13–0.17	5.1–6.5	Moderate.
10–25	95–100	90–100	40–80	30–55	2.0–6.0	0.10–0.12	4.5–5.5	Low.
10–25	95–100	90–100	60–80	50–75	2.0–6.0	0.12–0.14	4.5–5.5	Low.
10–25	95–100	90–100	60–80	50–75	2.0–6.0	0.10–0.12	4.5–5.5	Low.
0–30	95–100	90–100	80–95	75–90	0.2–0.6	0.13–0.16	4.5–5.5	Moderate.
----------	80–100	75–100	70–100	65–95	0.6–2.0	0.19–0.22	4.5–6.0	Low.
----------	80–100	75–100	70–100	65–95	0.06–0.2	0.10–0.12	4.5–5.5	Moderate.
----------	100	100	70–100	45–75	0.6–6.0	0.13–0.18	4.5–6.5	Low.
----------	100	100	75–100	45–80	2.0–6.0	0.12–0.16	4.5–5.5	Low.
----------	100	100	45–100	35–50	2.0–6.0	0.08–0.12	4.5–5.5	Low.
----------	95–100	90–100	85–95	80–90	0.6–2.0	0.18–0.22	5.6–7.3	Low.
----------	100	100	85–95	80–90	0.6–2.0	0.19–0.22	4.5–7.8	Low.
----------	100	100	95–100	85–95	0.6–2.0	0.18–0.22	4.5–5.5	Low.
----------	100	100	85–95	80–90	0.6–2.0	0.18–0.22	4.5–5.5	Low.
----------	100	100	85–95	80–90	0.6–2.0	0.19–0.22	4.5–6.5	Low.
----------	100	100	95–100	85–95	0.6–2.0	0.18–0.22	4.5–5.5	Low.
----------	100	100	95–100	85–95	0.6–2.0	0.18–0.22	5.6–6.5	Low.
----------	95–100	90–100	85–95	80–90	0.6–2.0	0.18–0.22	5.6–7.3	Low.
----------	60–80	55–75	50–70	45–65	0.6–2.0	0.11–0.15	5.6–7.3	Low.
----------	100	100	85–95	80–90	0.6–2.0	0.19–0.22	5.6–7.3	Low.
----------	100	100	90–100	85–95	0.6–2.0	0.16–0.20	5.6–7.3	Moderate.
----------	100	100	95–100	90–95	0.2–0.6	0.12–0.16	5.6–7.3	High.
----------	95–100	90–100	50–80	30–55	2.0–6.0	0.12–0.16	<4.5–5.5	Low.
----------	90–100	80–100	40–80	20–55	2.0–6.0	0.10–0.14	<4.5–5.5	Low.
0–25	65–100	60–100	30–85	10–35	2.0–6.0	0.10–0.13	4.5–5.5	Low.
0–35	60–100	50–100	45–95	15–90	0.6–2.0	0.14–0.18	4.5–5.5	Low.
0–30	65–95	55–90	45–75	35–65	0.6–2.0	0.12–0.16	4.5–5.5	Low.
0–30	65–95	55–90	50–75	40–75	0.6–2.0	0.10–0.14	4.5–5.5	Low.
0–30	65–95	55–90	50–75	40–75	0.6–2.0	0.10–0.14	4.5–5.5	Low.
0–60	95–100	90–100	85–95	80–95	0.2–0.6	0.05–0.18	4.5–5.5	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface of typical profile	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified [1]	AASHTO [1]
	Feet	*Feet*	*Inches*			
Steff: Sh	>5	[2] 1½–2	0–48	Silt loam	ML	A–4
			48–60	Sandy loam	SM	A–2, or A–4
Steinsburg: SkC, SlD, SlF	1½–3½	>6	0–25	Sandy loam	SM	A–2, or A–4
			25–35	Channery loamy sand.	SM	A–2
			35	Sandstone.		
Stendal: Sn, So	>5	[2] ½–1½	0–40	Silt loam	ML	A–4
			40–60	Fine sandy loam	SM or ML	A–4
Stendal variant: Ss	>3½	[2] ½–1½	0–23	Fine sandy loam	SM or ML	A–2 or A–4
			23–50	Gravelly fine sandy loam.	SM or ML	A–2 or A–4
Tilsit: TlB, TlC	>3½	1½–2	0–11	Silt loam	ML	A–4
			11–26	Silt loam	ML	A–4
			26–43	Silt loam (fragipan).	ML or CL–ML	A–4 or A–6
			43	Sandstone.		
Weikert: WcF	1–1½	>6	0–4	Channery silt loam	GM or SM	A–4
			4–18	Channery silt loam	GM or SM	A–4
			18	Hard siltstone.		
Whitley: WhB, WhC, WhD, WtA, WtB, WtC.	>3½	>4	0–8	Silt loam	ML	A–4
			8–40	Silty clay loam	CL–ML or CL	A–6 or A–4
			40–60	Gravelly silty clay loam.	CL–ML or ML	A–4

[1] Estimates are based on all material less than 3 inches in size.
[2] Areas of Bonnie silt loam (Bn) are subject to flooding in places.

soil in other counties. In the following paragraphs are explanations of some of the columns in table 5.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Soil texture is described in table 5 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 5 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content; that is, the extent to which the soil shrinks as it dries or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

Engineering interpretations of soils

The estimated interpretations in table 6 are based on the engineering properties of soils shown in table 5, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers

significant to engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
Percent					*Inches per hour*	*Inches per inch of soil*	*pH*	
----------	100	100	85–95	80–90	0.6–2.0	0.19–0.23	4.5–6.0	Low.
----------	100	100	50–60	30–40	0.6–6.0	0.10–0.14	4.5–5.5	Low.
0–15	85–100	75–100	40–80	20–40	2.0–6.0	0.08–0.12	4.5–5.5	Low.
10–30	80–90	60–80	30–50	10–20	2.0–6.0	0.03–0.05	4.5–5.5	Low.
----------	----------	100	85–95	80–90	0.6–2.0	0.19–0.22	4.5–5.5	Low.
----------	----------	100	50–75	40–55	2.0–6.0	0.12–0.16	4.5–5.5	Low.
----------	75–100	55–100	40–80	20–60	2.0–6.0	0.10–0.14	4.5–5.5	Low.
----------	75–100	55–100	40–80	20–60	2.0–6.0	0.09–0.14	4.5–5.5	Low.
----------	90–100	85–100	80–95	75–90	0.6–2.0	0.19–0.22	4.5–6.5	Low.
----------	90–100	85–100	80–95	75–90	0.6–2.0	0.19–0.22	4.5–5.5	Low.
----------	90–100	85–100	80–95	75–90	0.06–0.2	0.09–0.11	4.5–5.5	Low.
25–40	60–80	50–65	45–60	40–50	2.0–6.0	0.10–0.14	4.5–6.0	Low.
25–40	60–80	50–65	45–60	40–50	2.0–6.0	0.06–0.08	4.5–5.5	Low.
----------	95–100	90–100	85–100	80–90	0.6–2.0	0.19–0.22	4.5–6.5	Low.
----------	95–100	90–100	85–100	75–95	0.6–2.0	0.18–0.22	4.5–5.5	Low.
0–5	80–100	70–100	65–95	60–95	0.6–2.0	0.14–0.18	4.5–5.5	Low.

[3] Areas of these soils are subject to flooding in places.
[4] Areas of Stendal silt loam (Sn) are subject to flooding in places.

and soil scientists with the soils of Laurel and Rockcastle Counties. In table 6 suitability ratings are given for use of the soils as a source of road fill and topsoil. For other selected uses, table 6 lists those soil features not to be overlooked in planning, installation, and maintenance.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as when preparing a seedbed; natural fertility of the soil material; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but damage that will result at the area from which topsoil is taken was also considered in making the ratings.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

Drainage of cropland and pasture is affected by such soil properties as permeability, texture, and structure; depth to claypan, bedrock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion, or soil blowing; soil texture; content of stones; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water; amount of water held available to plants; and need for drainage, or depth to water table or bedrock.

Terraces and diversions are embankments or ridges constructed across the slope to intercept runoff and seepage so that they soak into the soil or flow slowly to a prepared outlet. Features that affect suitability

TABLE 6.—*Interpretations of engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. structions for referring to other series that appear in the first column of this table. Rock outcrop

Soil series and map symbols	Suitability as a source of—		Soil features affecting—	
	Road fill	Topsoil	Farm ponds	
			Reservoir area	Embankment
Allegheny: AlB, AlC	Fair: ML or CL material.	Fair: clay loam subsoil; slopes are more than 6 percent in places.	Pervious substratum	Medium compressibility.
Bedford: BdB	Fair: ML or CL material.	Fair: silty clay loam subsoil.	No unfavorable features.	Fair to good compaction characteristic; medium compressibility.
Berea: BgC, BgD	Poor: material less than 3 feet thick in places.	Fair to poor: silty clay loam subsoil; slopes are more than 12 percent in places.	Bedrock at a depth of 1½ to 3½ feet.	Medium compressibility.
Bonnie: Bn, Bo	Poor: poorly drained	Poor: poorly drained.	Pervious substratum; seasonal high water table at a depth of 0 to ½ foot.	Subject to piping; fair to poor compaction characteristics.
Britwater: BtB, BtC	Fair: ML or CL material.	Poor: more than 15 percent coarse fragments.	Sinkholes and seepage cracks in bedrock in places; moderate permeability.	Medium compressibility.
*Brookside: BxF For Faywood part, see Faywood series; Rock outcrop part is too variable to estimate.	Poor: slopes are more than 30 percent.	Poor: slopes are more than 30 percent.	Slopes are 30 to 65 percent.	Rock outcrop; fair to poor compaction characteristics.
*Caneyville: CcD, CcE, CdD, CdE. For Hagerstown part of CcD and CcE, see Hagerstown series; for Shelocta part of CdD and CdE, see Shelocta series.	Poor: bedrock at a depth of less than 3½ feet; slopes are more than 20 percent in places; MH material in places.	Poor: silty clay loam or silty clay subsoil; slopes are more than 12 percent in places.	Rock outcrop; bedrock at a depth of 1½ to 3½ feet; bedrock fractured in places.	Rock outcrop; bedrock at a depth of 1½ to 3½ feet; fair to poor compaction characteristics.
Chagrin: Cf	Fair: ML material	Fair: 0 to 15 percent coarse fragments.	Pervious material	Subject to piping; fair to poor compaction characteristics.
Colyer variant: ClD	Poor: shale at a depth of less than 1½ feet.	Poor: difficult to revegetate; slopes are more than 12 percent.	Shale at a depth of ½ to 1½ feet.	Shale at a depth of ½ to 1½ feet; quality of material limited.
Cotaco: Co	Fair: ML or CL material.	Fair: 0 to 15 percent coarse fragments.	Seasonal high water table at a depth of 1½ to 2 feet; pervious material.	Fair to good compaction characteristics.
Crider: CsB, CsC	Fair: ML or CL material.	Fair: silty clay loam subsoil; slopes are more than 6 percent in places.	Pervious material	Medium compressibility; fair compaction characteristics.
Cuba: Cu	Fair: ML material	Good	Pervious material	Subject to piping; fair to poor compaction characteristics.

properties of the soils

Because the soils in such mapping units can have different properties and limitations, it is necessary to follow carefully the in-
(parts of BxF and FcD) and Strip mines (St) are so variable that their properties were not estimated]

Soil features affecting—Continued				
Drainage of cropland and pasture	Irrigation	Terraces and diversions	Grassed waterways	Foundation for low buildings
Well drained	Slopes are 2 to 12 percent.	No unfavorable features.	No unfavorable features.	Medium compressibility; slopes are 2 to 12 percent.
Fragipan at a depth of 1½ to 2½ feet.	Fragipan at a depth of 1½ to 2½ feet; very slow permeability.	Seasonal water table at a depth of 1½ to 2 feet.	Fragipan at a depth of 1½ to 2½ feet.	Seasonal water table at a depth of 1½ to 2 feet; medium compressibility.
Moderately well drained.	Moderately slow permeability; slopes are 6 to 20 percent.	Moderately slow permeability in subsoil; slopes are 6 to 20 percent.	Slopes are 6 to 20 percent.	Medium compressibility; slopes are 6 to 20 percent.
Seasonal high water table at a depth of 0 to ½ foot.	Seasonal high water table at a depth of 0 to ½ foot; poorly drained.	Nearly level; on flood plains; seasonal high water table at a depth of 0 to ½ foot.	On flood plains; nearly level.	Subject to flooding; seasonal high water table at a depth of 0 to ½ foot.
Well drained	No unfavorable features.	Karst topography in places.	Cherty	Medium compressibility; slopes are 2 to 12 percent.
Well drained	Slopes are 30 to 65 percent.	Slopes are 30 to 65 percent.	Slopes are 30 to 65 percent; erodible.	Slopes are 30 to 65 percent.
Well drained	Slopes are 6 to 30 percent.	Slopes are 6 to 30 percent.	Rocky; erodible; slopes are 6 to 30 percent.	Rocky; bedrock at a depth of 1½ to 3½ feet; slopes are 6 to 30 percent.
Well drained	No unfavorable features.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding.
Somewhat excessively drained.	Shale at a depth of ½ to 1½ feet; slopes are 12 to 20 percent; droughty.	Shale at a depth of ½ to 1½ feet; slopes are 12 to 20 percent.	Slopes are 12 to 20 percent; shale at a depth of ½ to 1½ feet; droughty.	Shale at a depth of ½ to 1½ feet; slopes are 12 to 20 percent.
Seasonal high water table at a depth of 1½ to 2 feet.	Seasonal high water table at a depth of 1½ to 2 feet.	Seasonal high water table at a depth of 1½ to 2 feet.	Seasonal high water table at a depth of 1½ to 2 feet.	Seasonal high water table at a depth of 1½ to 2 feet.
Well drained	Slopes are 2 to 12 percent.	No unfavorable features.	No unfavorable features.	Medium compressibility.
Well drained	No unfavorable features.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—	
	Road fill	Topsoil	Farm ponds	
			Reservoir area	Embankment
Donahue: DoF	Poor: bedrock at a depth of less than 3½ feet; slopes are more than 40 percent; CH and MH material in places.	Poor: slopes are more than 40 percent; 0 to 30 percent coarse fragments.	Bedrock at a depth of 1½ to 3½ feet; cracks in bedrock in places.	Bedrock at a depth of 1½ to 3½ feet; poor compaction characteristics.
*Faywood: FcD. For Opequon part, see Opequon series; Rock outcrop part is too variable to estimate.	Poor: bedrock at a depth of less than 3½ feet; slopes are more than 20 percent in places; MH material.	Poor: silty clay subsoil; slopes are more than 12 percent.	Bedrock at a depth of 1½ to 3½ feet; bedrock fractured in places.	Bedrock at a depth of 1½ to 3½ feet; poor compaction characteristics.
Frederick: FdB, FdC, FdD, FhD3.	Poor: MH or CL material.	Fair to poor: silty clay subsoil; slopes are more than 12 percent in places.	Sinkholes in places; pervious material.	Fair to poor compaction characteristics.
Hagerstown. Mapped only in complex with Caneyville soils.	Poor: MH or CL material; slopes are more than 20 percent in places.	Fair to poor: silty clay or clay subsoil; slopes are more than 12 percent in places.	Sinkholes in places; pervious material.	Fair to poor compaction characteristics.
Jefferson: JlF. For Latham part, see Latham series.	Poor: slopes are more than 25 percent.	Poor: slopes are more than 25 percent; 10 to 25 percent coarse fragments.	Slopes are 25 to 40 percent.	Fair compaction characteristics.
*Latham: LbB, LbC, LbD, LdD3, LhD. For Lily part of LhD, see Lily series.	Poor: MH or CL material; slopes are more than 20 percent in places.	Poor: silty clay subsoil; slopes are more than 12 percent in places.	Steep in places	Fair to poor compaction characteristics.
*Lily: LlB, LlC, LsD, LtE. For Steinsburg part of LtE, see Steinsburg series.	Poor: bedrock at a depth of 1½ to 3½ feet; slopes are more than 20 percent in places.	Fair to poor: clay loam subsoil; slopes are more than 12 percent in places.	Pervious substratum; bedrock at a depth of 1½ to 3½ feet.	Low to medium compressibility; fair compaction characteristics.
Lindside: Lv	Fair: ML material	Good	Pervious material	Subject to piping; fair to poor compaction characteristics.
Morehead: Mo	Fair: ML or CL material.	Good	Seasonal high water table; pervious material.	Fair to good compaction characteristics.
Morehead variant: Mv	Fair: ML or CL material; somewhat poorly drained.	Good	Seasonal high water table; pervious material.	Fair to good compaction characteristics.
Newark: Nd	Fair: ML material; somewhat poorly drained.	Good	Pervious material	Subject to piping; fair to poor compaction characteristics.
Newark variant: Ng	Fair: ML material; somewhat poorly drained.	Poor: more than 15 percent pebbles.	Pervious material	Subject to piping; fair to poor compaction characteristics.
Nolin: No	Fair: ML material	Good	Pervious material	Subject to piping; fair to poor compaction characteristics.

properties of the soils—Continued

Soil features affecting—Continued				
Drainage of cropland and pasture	Irrigation	Terraces and diversions	Grassed waterways	Foundation for low buildings
Well drained	Slopes are 40 to 65 percent; bedrock at a depth of 1½ to 3½ feet; rocky.	Bedrock at a depth of 1½ to 3½ feet; slopes are 40 to 65 percent; rocky.	Slopes are 40 to 65 percent; rocky.	Bedrock at a depth of 1½ to 3½ feet; slopes are 40 to 65 percent.
Well drained	Slopes are 12 to 65 percent; bedrock at a depth of 1½ to 3½ feet.	Bedrock at a depth of 1½ to 3½ feet; slopes are 12 to 65 percent.	Slopes are 12 to 65 percent.	Bedrock at a depth of 1½ to 3½ feet; slopes are 12 to 65 percent.
Well drained	Slopes are 2 to 20 percent.	Slopes are 2 to 20 percent; karst topography in places.	No unfavorable features.	Slopes are 2 to 20 percent.
Well drained	Slopes are more than 12 percent in most places; rocky.	Slopes are more than 8 percent in most places; rocky.	Rocky; erodible	Slopes are 6 to 30 percent; rocky.
Well drained	Slopes are 25 to 40 percent.	Slopes are 25 to 40 percent.	Slopes are 25 to 40 percent.	Slopes are 25 to 40 percent.
Moderately well drained.	Slopes are 2 to 50 percent.	Slopes are 2 to 50 percent.	Slopes are 2 to 50 percent.	Slopes are 2 to 50 percent.
Well drained	Slopes are 2 to 30 percent.	Slopes are 2 to 30 percent.	Slopes are 2 to 30 percent; erodible.	Slopes are 2 to 30 percent; bedrock at a depth of 1½ to 3½ feet.
Seasonal high water table at a depth of 1½ to 2 feet.	Seasonal high water table at a depth of 1½ to 2 feet.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding; seasonal high water table at a depth of 1½ to 2 feet.
Seasonal high water table at a depth of 1½ to 2 feet.	Seasonal high water table at a depth of 1½ to 2 feet.	Nearly level in places	No unfavorable features.	Seasonal high water table at a depth of 1½ to 2 feet.
Seasonal high water table at a depth of ½ to 1½ feet.	Seasonal high water table at a depth of ½ to 1½ feet.	Nearly level in most places.	Nearly level in most places.	Seasonal high water table at a depth of ½ to 1½ feet.
Seasonal high water table at a depth of ½ to 1½ feet.	Seasonal high water table at a depth of ½ to 1½ feet.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding; seasonal high water table at a depth of ½ to 1½ feet.
Seasonal high water table at a depth of ½ to 1½ feet.	Seasonal high water table at a depth of ½ to 1½ feet.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding; seasonal high water table at a depth of ½ to 1½ feet.
Well drained	No unfavorable features.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—	
	Road fill	Topsoil	Farm ponds	
			Reservoir area	Embankment
Opequon: ---------- Mapped only in complex with Faywood soils.	Poor: bedrock at a depth of 1 to 1½ feet; slopes are more than 20 percent in places; CH or MH material.	Poor: clay subsoil; bedrock at a depth of 1 to 1½ feet; slopes are more than 12 percent.	Bedrock at a depth of 1 to 1½ feet; cracks in rocks in places.	Bedrock at a depth of 1 to 1½ feet; fair to poor compaction characteristics.
Pope: Po ----------	Good to fair: high percentage of fine material.	Good ----------	Pervious material -----	Medium to high susceptibility to piping.
Rigley: RgF ----------	Poor: slopes are more than 20 percent.	Poor: slopes are more than 20 percent; 10 to 25 percent coarse fragments.	Slopes are 20 to 60 percent.	Fair to good compaction characteristics.
*Shelocta: SbC, SbD, SbE, ScF, SdD, SdE, SdF, SgE, SgF. For Latham part of SdD, SdE, and SdF, see Latham series; For Rigley part SgE and SgF, see Rigley series.	Fair: ML–CL material; poor where slopes are more than 20 percent.	Fair to poor: 5 to 30 percent coarse fragments; slopes are more than 12 percent in places.	Slopes are 6 to 50 percent.	Good to poor compaction characteristics.
Steff: Sh ----------	Fair: ML material --	Good ----------	Pervious material -----	Subject to piping; fair to poor compaction characteristics.
Steinsburg: SkC, SlD, SlF ----------	Poor: soil material generally less than 3 feet thick.	Fair to poor: 0 to 15 percent coarse fragments; slopes are 6 to 50 percent.	Pervious material; slopes are 6 to 50 percent; bedrock at a depth of 1½ to 3½ feet.	Medium to high susceptibility to piping; slopes are 6 to 50 percent.
Stendal: Sn ----------	Fair: ML material; somewhat poorly drained.	Good ----------	Pervious material -----	Subject to piping; fair to poor compaction characteristics.
So ----------	Fair: ML material; somewhat poorly drained.	Good ----------	Pervious material -----	Subject to piping; fair to poor compaction characteristics.
Stendal variant: Ss ----	Fair: somewhat poorly drained.	Good to poor: 0 to 30 percent coarse fragments.	Pervious material -----	Subject to piping -----
Tilsit: TlB, TlC ---------	Fair: ML material --	Good to fair: slopes are more than 6 percent in places.	No unfavorable features.	Fair to poor compaction characteristics; subject to piping.
Weikert: WcF ---------	Poor: slopes are less than 40 to 80 percent; bedrock at a depth of 1½ feet.	Poor: 35 to 50 percent coarse fragments; slopes are 40 to 80 percent; bedrock at a depth of 1 to 1½ feet.	Bedrock at a depth of 1 to 1½ feet.	Bedrock at a depth of 1 to 1½ feet.
Whitley: WhB, WhC, WhD, WtA, WtB, WtC.	Fair: ML or CL–ML material; slopes are more than 12 percent in places.	Fair to poor: silty clay loam subsoil; slopes are more than 12 percent in places.	No unfavorable features.	Fair compaction characteristics; subject to piping.

properties of the soils—Continued

Soil features affecting—Continued				
Drainage of cropland and pasture	Irrigation	Terraces and diversions	Grassed waterways	Foundation for low buildings
Well drained	Slopes are 12 to 30 percent; droughty.	Slopes are 12 to 30 percent; bedrock at a depth of 1 to 1½ feet.	Erodible; slopes are 12 to 30 percent; bedrock at a depth of 1 to 1½ feet; droughty.	Bedrock at a depth of 1 to 1½ feet; slopes are 12 to 30 percent.
Well drained	No unfavorable features.	On flood plains	On flood plains	Subject to flooding.
Well drained	Slopes are 20 to 60 percent; stony.	Slopes are 20 to 60 percent; stony.	Slopes are 20 to 60 percent; stony.	Slopes are 20 to 60 percent.
Well drained	Slopes are 6 to 50 percent.	Slopes are 6 to 50 percent.	Slopes are 6 to 50 percent.	Slopes are 6 to 50 percent.
Seasonal high water table at a depth of 1½ to 2 feet.	Seasonal high water table at a depth of 1½ to 2 feet.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding; seasonal high water table at a depth of ½ to 2 feet.
Well drained	Slopes are 6 to 50 percent.	Slopes are 6 to 50 percent; rocky.	Slopes are 6 to 50 percent; rocky.	Slopes are 6 to 50 percent; bedrock at a depth of 1½ to 3½ feet.
Seasonal high water table at a depth of ½ to 1½ feet.	Seasonal high water table at a depth of ½ to 1½ feet.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding; seasonal high water table at a depth of ½ to 1½ feet.
Seasonal high water table at a depth of ½ to 1½ feet.	Seasonal high water table at a depth of ½ to 1½ feet.	Slopes are 0 to 4 percent on stream terraces.	Slopes are 0 to 4 percent on stream terraces.	Seasonal high water table at a depth of ½ to 1½ feet.
Seasonal high water table at a depth of ½ to 1½ feet.	Seasonal high water table at a depth of ½ to 1½ feet.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding; seasonal high water table at a depth of ½ to 1½ feet.
Moderately well drained; slow permeability.	Fragipan at a depth of 1½ to 2½ feet; slow permeability.	Seasonal water table at a depth of 1½ to 2 feet; fragipan at a depth of 1½ to 2½ feet.	Fragipan at a depth of 1½ to 2½ feet.	Seasonal water table at a depth of 1½ to 2 feet.
Well drained	Slopes are 40 to 80 percent; droughty.	Slopes are 40 to 80 percent; bedrock at at a depth of 1 to 1½ feet.	Slopes are 40 to 80 percent; bedrock at a depth of 1 to 1½ feet; droughty.	Slopes are 40 to 80 percent; bedrock at a depth of 1 to 1½ feet.
Well drained	Slopes are 0 to 20 percent in places.	Slopes are 0 to 20 percent.	Slopes are 0 to 20 percent in places.	Slopes are 0 to 20 percent in places.

of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

The layout and construction of grassed waterways are affected by such soil properties as texture, depth, and erodibility of the soil material; presence of stones or rock outcrops; and the steepness of slopes. Other factors affecting waterways are seepage, natural soil drainage, available water capacity, susceptibility to siltation, and the ease of establishing and maintaining vegetation.

Low buildings are those that have no more than three stories. The properties affecting the foundation support are those that affect bearing capacity and settlement under load and those that affect excavation and construction costs. Other factors considered are wetness, flooding, compressibility, shrink-swell potential, slope, depth to bedrock, and stoniness and rockiness.

Soil test data

Table 7 contains engineering test data for some of the major soil series in Laurel and Rockcastle Counties. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic

TABLE 7.—*Engineering*

[Tests made by Kentucy Department

Soil name and location	Parent material	Report No. S65-Ky-	Depth from surface	Moisture density [1]		Mechanical analysis [2]	
				Maximum dry density	Optimum moisture	Percentage less than 3 inches passing sieve [3]—	
						¾ inch	No. 4 (4.7 mm)
			In	*Lb/ft³*	*Pct*		
Frederick silt loam:							
Rockcastle County; 1½ miles E. of Clear Creek. (The 52 to 65 inch layer contains less clay than is typical for the series.)	Limestone	102-20	6–12	109	17	----------	----------
			20–32	97	24	----------	----------
			52–65	88	27	----------	----------
Lily loam:							
Laurel County; 1½ miles W. of Flat Woods Church. (The profile contains slightly more sand than is typical for the series.)	Sandstone	63–5	3–10	118	12	----------	----------
			13–26	110	19	----------	----------
			30–32	113	15	----------	----------
Rigley stony fine sandy loam:							
Laurel County; 1 mile SW. of Bernstadt. (Modal)	Sandstone	63–1	6–11	117	12	99	98
			26–31	117	13	100	98
			40–51	126	10	100	97
Shelocta silt loam:							
Laurel County; 1 mile W. of West Oak Church. (The 19 to 29 inch layer contains more gravel and less clay than is typical for the series.)	Sandstone, siltstone, and shale.	63–19	7–12	111	16	96	87
			19–29	117	13	94	77
			35–45	110	17	100	99
Whitley silt loam:							
Laurel County; ½ mile S. of Sinking Creek Church. (Modal)	Sandstone, siltstone, and shale.	63–18	7–12	109	13	100	99
			16–21	106	18	----------	----------
			26–31	97	24	100	98

[1] Based on AASHTO Designation T 99–57 (*1*).

[2] Mechanical analyses according to AASHTO Designation: T 88–57 (*1*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes of soils.

limits. The mechanical analyses were made by combined sieve and hydrometer methods.

Compaction (or moisture density) data are important in earthwork. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that density decreases with increases in moisture content. The highest dry density obtained in the compactive test is termed maximum dry density. As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from semisolid to plastic. If the moisture content is further increased, the material changes from plastic to liquid. The plastic limit is the moisture content at which the soil material changes from semisolid to plastic. The liquid limit is the moisture content at which the soil material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Specific gravity is the weight of the soil solids, excluding pore space, compared to the weight of an equal volume of water at a specified temperature.

test data

of Highway Research Laboratory]

Mechanical analysis [3]—Continued							Liquid limit	Plasticity index	Classification		Specific gravity [6]
Percentage less than 3 inches passing sieve [3]—Cont.			Percentage smaller than—						AASHTO [4]	Unified [5]	
No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm					
							Pct				
100	97	88	86	71	36	25	35	14	A–6	CL	2.68
100	98	93	89	73	55	48	42	17	A–7–6	CL–ML	2.66
100	99	90	86	72	46	32	45	16	A–7–6	CL–ML	2.70
100	99	48	39	26	12	7	[7] NP	[7] NP	A–4	SM	2.65
100	99	45	41	34	28	26	NP	NP	A–4	SM	2.67
100	99	38	23	14	8	7	NP	NP	A–4	SM	2.70
96	84	28	26	22	11	5	NP	NP	A–2–4	SM	2.61
98	81	33	32	29	21	16	20	4	A–2–4	SM–SC	2.64
79	45	15	13	12	9	6	NP	NP	A–1–6	SM	2.62
79	71	61	56	41	23	17	23	3	A–4	ML	2.73
64	56	48	43	29	16	11	26	7	A–4	SC–SM	2.69
85	75	57	53	39	24	17	29	8	A–4	CL–ML	2.74
99	98	81	71	21	14	7	NP	NP	A–4	ML	2.64
----------	100	82	73	56	37	29	30	11	A–6	CL	2.69
98	98	79	71	60	48	43	38	9	A–4	ML	2.76

[3] Material larger than 3 inches discarded from sample.
[4] Based on AASHTO Designation M 145–49 (*1*).
[5] SCS and BPR have agreed that any soil having a plasticity index within two points of the A-line is to be given a borderline classification; an example of a borderline classification is CL–ML.
[6] Based on AASHTO Designation T 100–60 (*1*).
[7] NP means nonplastic.

Town and country planning

The amount of farmland in the survey area is slowly decreasing and the population is increasing as residential, commercial, and recreational facilities are developed. The area around London in Laurel County is rapidly becoming residential. One effect of this expansion is the increasing need for useful and reliable information about the use of the soils for nonfarm purposes. Recreational facilities are increasing rapidly in the Daniel Boone National Forest and around the lakes.

This section provides information on the properties of soils that affect selected nonfarm uses of land. It will help community planners, developers, and individual landowners to determine the most suitable use for a particular area. Other useful information can be found on the soil maps and in other parts of the Survey, particularly the section "Descriptions of the Soils" and "Engineering Uses of the Soils."

In table 8 the estimated degree and kinds of limitations of soils are given for selected uses. These limitations are rated *slight, moderate,* or *severe.* If the rating is *moderate* or *severe,* the main limiting property or properties are given. The ratings are based on the degree of the greatest single limitation. For example, if flooding severely limits the use of a soil for the disposal of sewage effluent from septic tanks, the limitation is rated *severe,* even if the soil is well suited to that use in all other respects.

A rating of *slight* indicates that the soil has no important limitations for the specified use. *Moderate* indicates that the soil has some limitations for the specified use. These limitations need to be recognized, but they can be overcome or corrected. *Severe* indicates that the soil has serious limitations that are difficult to overcome, but it does not mean that the soil cannot be used for the specific use.

Discussed in the following paragraphs are the properties considered in rating the limitations for each of the uses given in table 8.

Septic tank absorption fields. The soils were rated according to their limitations for disposing of effluent from septic tanks. The soil features considered are permeability; depth to the seasonal water table; hazard of flooding; degree of slope, stoniness, or rockiness; and depth to hard rock or other impervious materials. The soils rated *slight* generally have few or no limitations that affect their use as absorption fields. Those rated *moderate* are borderline soils and should be investigated carefully at the exact site of installation. Absorption fields may need to be larger in some of the soils rated *moderate* than in those rated *slight.* All soils rated *severe* should be very carefully investigated to determine if an absorption field can be expected to function adequately.

Shallow excavations. These are excavations less than 6 feet deep that are made for a variety of uses, such as basements, ditches, graves, underground cables, pipelines, and sewers. Considered in rating the soils for these use are wetness, hazard of flooding, degree of slope, depth to bedrock, texture, stoniness, and rockiness.

Dwellings with and without basements. Dwellings are not more than 3 stories high, or have foundation loads equal to 3 stories, and have less than an 8 foot excavation for basements. Considered in rating the soils for dwellings are soil drainage, seasonal high water table, hazard of flooding, degree of slope, shrink-swell potential, kind of soil material, potential frost action, stoniness, rockiness, and depth to bedrock. Depth to rock, depth to seasonal high water table, and natural soil drainage are less severe limitations for buildings that do not have a basement. Methods of sewage disposal are not considered in the rating for dwellings.

Sanitary landfill is an engineering method of disposing of solid wastes on or in the soil by spreading the waste in thin layers, compacting it to the smallest practical volume, and covering the waste with soil each day to provide maximum protection of the environment. Soil surveys are a valuable tool in selecting potential alternate sites for a proposed sanitary landfill operation, but they do not substitute for detailed geologic investigations because soil borings are normally limited to a depth of five or six feet. Thus, they do not provide data needed at greater depths.

Soil surveys are especially useful in preliminary determinations of those sites that are not well suited to sanitary landfill operations, and thus save the time and expense of more detailed investigations. They can indicate those sites where favorable soils are located and where additional investigations appear warranted. The design engineer, however, still needs to determine actual soil conditions to the depth necessary to obtain valid data for design purposes.

In table 8 the degree of soil limitations and the soil features causing moderate or severe limitations are provided for trench type landfills. The trench-type landfill is a dug trench in which refuse is buried and covered with a layer of soil material excavated in the digging of the trench. Considered in rating the soils are soil drainage, hazard of flooding, permeability, degree of slope, texture, depth to bedrock, stoniness, and rockiness.

Local roads and streets have some kind of all weather surface, commonly asphalt or concrete, and are expected to carry automobile traffic all year, but not fast, heavy trucks. Properties that affect design and construction of roads and streets are those that affect the load-supporting capacity and stability of the subgrade, and those that affect the workability and amount of cut and fill. The Unified classification of the soil material and the shrink-swell potential give an indication of the traffic-supporting capacity. Seasonal high water table and flooding affect stability. Slope, depth to bedrock, stoniness, and rockiness affect the ease of excavation and the amount of cut and fill needed to reach an even grade. Soil limitation ratings in table 8 do not substitute for basic soil data or for onsite investigations.

Camp areas are used for tents, camping trailers, and picnics. Properties considered are wetness, hazards of flooding, permeability, degree of slope, surface soil texture, the amount of coarse fragments on the surface, stoniness, and rockiness.

Playgrounds are areas used intensively for baseball, football, badminton, and for other similar organized games. These areas are subject to intensive foot traffic. Considered in rating the soils are wetness, hazard of

flooding, permeability, degree of slope, surface soil texture, depth to bedrock, amount of coarse fragments on the surface, stoniness, and rockiness.

Picnic areas are attractive natural or landscaped tracts used mainly for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. Considered in rating the soils are wetness, hazard of flooding, degree of slope, surface soil texture, amount of coarse fragments on the surface, stoniness, and rockiness.

Paths and trails are used for local and cross country footpaths and trails and for bridle paths. It is assumed that these areas will be used as they occur in nature and that little or no soil will be moved. Considered in rating the soils are wetness, hazard of flooding, degree of slope, surface soil texture, amount of coarse fragments on the surface, rockiness, and stoniness.

Formation, Morphology, and Classification of the Soils

In this section the major factors that affect the formation and morphology of the soils of Laurel and Rockcastle Counties are discussed, and the soils are classified in higher categories.

Factors of Soil Formation

Soils formed through the interaction of five major factors: climate, plant and animal life, parent material, relief, and time. The relative influence of each factor generally varies from place to place. Local variations in soils are caused by differences in kind of parent material and relief. In places one factor may dominate the formation of a soil and determine most of its properties.

Climate

The climate of Laurel and Rockcastle Counties is temperate. Winters are moderately cold, and summers are warm and humid. Annual precipitation is about 47 inches, and the mean annual air temperature is about 45° F. The soils were moist and subject to leaching during formation, and for this reason the soluble bases have been largely leached out of the solum and clay minerals have moved from the surface layer into the subsoil. Climate has been a relatively uniform factor within the survey area, and it accounts for only very slight differences among the soils.

Plant and animal life

All living organisms—vegetation, animals, bacteria, and fungi—are important to soil formation. Vegetation is generally responsible for the organic matter content, the color of the surface layer, and the amount of nutrients. Earthworms, cicada, and burrowing animals help to keep the soil open and porous. Bacteria and fungi decompose the vegetation, thus releasing nutrients for plants. In the survey area the native forests have had more influences on soil formation than any other living organism. Man, however, has had great influence on the characteristics of the surface layer by clearing the forests and plowing the land. He has added fertilizers, mixed some of the soil horizons, and moved soil material from place to place.

Parent material

Parent material is the unconsolidated mass of geologic material from which the soils formed. It determines the mineralogical and chemical composition of the soil and, to a large extent, the rate at which soil forming processes takes place. In Laurel and Rockcastle Counties, soils formed mostly from material weathered from rocks in place; from alluvium washed from uplands and deposited along the streams and in depressions; and from colluvium moved relatively short distances from a higher to a lower position. Most of the parent material weathered from rock formations that are mainly limestone, siltstone, sandstone, and shale. For example, Frederick and Caneyville soils formed in material weathered from limestone; Lily and Steinsburg soils, in material weathered from sandstone; Latham soils, in material weathered from shale; Nolin soils, in alluvium; and Shelocta and Jefferson soils, in colluvium.

Relief

The southwestern part of Rockcastle County is gently sloping to moderately steep. The elevation in much of this area ranges from 1,000 to 1,100 feet. The topography generally is made up of narrow ridgetops and valleys and short side slopes, but some areas have gently sloping to sloping karst topography with little or no natural stream drainage. Drainage water in the karst areas terminates in sinkholes or basins.

Except for some small areas, the rest of Rockcastle County and all of Laurel County is mostly sloping to very steep. The ridgetops are narrow and sloping, the side slopes are long and steep, and the alluvial valleys are very narrow and nearly level. The elevation in much of this area ranges from 1,000 to 1,400 feet above sea level.

The slope of the landform and the position of the slopes have greatly influenced the formation of the soils in the survey area. Soils that formed in sloping to steep areas where runoff is moderate to rapid generally are well drained and have a bright colored subsoil. Deep, well drained soils at the foot of steep slopes formed in material accumulated from higher, steeper areas. In gently sloping or nearly level areas where runoff is slow, the soils commonly exhibit such evidence of wetness for short periods as gray mottling in the subsoil. Local differences in soils are largely the result of differences in relief and parent material.

Time

Generally it takes many years for changes to take place in the parent material and for soils to form. Soils that formed on low bottoms and are subject to varying degrees of overflow may receive new sediment with each flooding. These soils have only weak soil structure and weak color differences among the horizons. An example is Nolin soils. Soils such as Frederick that have well developed soil horizons have been forming for longer periods than Nolin soils.

TABLE 8.—*Limitations of soils to consider*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. structions for referring to other series that appear in the first column of this table. Rock outcrop

Soil series and map symbols	Estimated degree of soil limitations for—			
	Septic tank absorption fields	Shallow excavations	Dwellings	
			With basement	Without basement
Allegheny:				
AlB	Slight	Moderate: clay loam subsoil.	Moderate: CL or ML soil material.	Moderate: CL or ML soil material.
AlC	Moderate: slope is 6 to 12 percent.	Moderate: clay loam subsoil; slope is 6 to 12 percent.	Moderate: CL or ML soil material; slope is 6 to 12 percent.	Moderate: CL or ML soil material; slope is 6 to 12 percent.
Bedford: BdB	Severe: very slow permeability; seasonal water table at a depth of 1½ to 2 feet.	Moderate: moderately well drained.	Severe: seasonal water table at a depth of 1½ to 2 feet.	Moderate: seasonal water table at a depth of 1½ to 2 feet; CL or ML soil material.
Berea:				
BgC	Severe: moderately slow permeability; bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of 1½ to 3½ feet.	Severe: bedrock at a depth of less than 3½ feet.	Moderate: bedrock at a depth of 1½ to 3½ feet.
BgD	Severe: bedrock at a depth of less than 3½ feet; moderately slow permeability; slope is 12 to 20 percent.	Severe: bedrock at a depth of 1½ to 3½ feet; slope is 12 to 20 percent.	Severe: bedrock at a depth of less than 3½ feet; slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.
Bonnie:				
Bn	Severe: seasonal water table at a depth of less than ½ foot; subject to flooding.	Severe: poorly drained; subject to flooding.	Severe: poorly drained; seasonal water table at a depth of less than ½ foot; subject to flooding.	Severe: poorly drained; subject to flooding.
Bo	Severe: seasonal water table at a depth of less than ½ foot.	Severe: poorly drained.	Severe: poorly drained; seasonal water table above a depth of ½ foot.	Severe: poorly drained; seasonal water table above a depth of ½ foot.
Britwater:				
BtB	Slight	Moderate: coarse fragments.	Moderate: ML or CL soil material.	Moderate: ML or CL soil material.
BtC	Moderate: slope is 6 to 12 percent.	Moderate: coarse fragments; slope is 6 to 12 percent.	Moderate: ML or CL soil material; slope is 6 to 12 percent.	Moderate: ML or CL soil material; slope is 6 to 12 percent.
*Brookside: BxF For Faywood part, see Faywood series; Rock outcrop part is too variable to estimate.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.
*Caneyville: CcD, CcE, CdD, CdE. For Hagerstown part of CcD and CcE, see Hagerstown series; for Shelocta part of CdD, and CdE, see Shelocta series.	Severe: bedrock at a depth of less than 3½ feet; moderately slow permeability; rocky; slope is 6 to 30 percent.	Severe: generally less than 3½ feet to bedrock; rocky; slope is 6 to 30 percent.	Severe: rocky; bedrock generally at a depth of less than 3½ feet; slope is 6 to 30 percent.	Severe: rocky; slope is 6 to 30 percent.

in town and country planning

Because the soils in such mapping units can have different properties and limitations, it is necessary to follow carefully the in- (parts of BxF and FcD) and Strip mines (St) are so variable that their properties were not estimated]

Estimated degree of soil limitations for—Continued					
Sanitary landfill [1] (trench type)	Local roads and streets	Camp areas	Playgrounds	Picnic areas	Paths and trails
Moderate: clay loam subsoil.	Moderate: CL or ML soil material.	Slight	Moderate: slope is 2 to 6 percent.	Slight	Slight.
Moderate: clay loam subsoil.	Moderate: CL or ML soil material; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Moderate: moderately well drained.	Moderate: CL or ML soil material; seasonal water table at a depth of 1½ to 2 feet.	Severe: very slow permeability.	Severe: very slow permeability.	Moderate: moderately well drained.	Slight.
Severe: bedrock at a depth of less than 3½ feet.	Moderate: bedrock at a depth of less than 3½ feet; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Severe: bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet; most slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Moderate: slope is 12 to 20 percent.
Severe: poorly drained; subject to flooding.	Severe: seasonal water table at a depth of less than ½ foot; subject to flooding.	Severe: poorly drained; subject to flooding.	Severe: poorly drained; subject to flooding.	Severe: poorly drained.	Severe: poorly drained.
Severe: poorly drained.	Severe: seasonal water table at a depth of less than 1 foot.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.
Moderate: silty clay loam.	Moderate: ML or CL soil material.	Moderate: coarse fragments.	Severe: coarse fragments.	Moderate: coarse fragments.	Moderate: coarse fragments.
Moderate: silty clay loam subsoil.	Moderate: ML or CL soil material; slope is 6 to 12 percent.	Moderate: coarse fragments; slope is 6 to 12 percent.	Severe: coarse fragments; slope is 6 to 12 percent.	Moderate: coarse fragments; slope 6 to 12 percent.	Moderate: coarse fragments.
Severe: slope is 30 to 65 percent; clayey subsoil.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.
Severe: bedrock at a depth of less than 3½ feet; rocky.	Severe: bedrock at a depth of less than 3½ feet; rocky; slope is 6 to 30 percent.	Severe: slope is 6 to 30 percent.	Severe: slope is 6 to 30 percent; rocky.	Severe: slope is 6 to 30 percent.	Moderate: rocky; slope is 6 to 30 percent.

TABLE 8.—*Limitations of soils to consider*

Soil series and map symbols	Estimated degree of soil limitations for—			
	Septic tank absorption fields	Shallow excavations	Dwellings	
			With basement	Without basement
Chagrin: Cf	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Colyer variant: ClD	Severe: bedrock at a depth of less than 1½ feet; slope is 12 to 20 percent.	Severe: bedrock at a depth of less than 1½ feet; slope is 12 to 20 percent.	Severe: bedrock at a depth of less than 1½ feet; slope is 12 to 20 percent.	Severe: bedrock at a depth of less than 1½ feet; slope is 12 to 20 percent.
Cotaco: Co	Severe: seasonal water table at a depth of 1½ to 2 feet.	Moderate: moderately well drained.	Severe: seasonal water table at a depth of 1½ to 2 feet.	Moderate: seasonal water table at a depth of 1½ to 2 feet.
Crider:				
CsB	Slight	Slight	Moderate: CL–ML soil material.	Moderate: CL–ML soil material.
CsC	Moderate: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Moderate: CL–ML soil material; slope is 6 to 12 percent.	Moderate: CL–ML soil material; slope is 6 to 12 percent.
Cuba: Cu	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Donahue: DoF	Severe: moderately slow permeability; slope is 40 to 75 percent; bedrock at a depth of less than 3½ feet; rocky.	Severe: slope is 40 to 75 percent; bedrock at a depth of less than 3½ feet; rocky.	Severe: slope is 40 to 75 percent; rocky; bedrock at a depth of less than 3½ feet.	Severe: slope is 40 to 75 percent; rocky.
*Faywood:				
Faywood part of BxF	Severe: slope is 30 to 65 percent; bedrock at a depth of less than 3½ feet.	Severe: slope is 30 to 65 percent; bedrock at a depth of generally less than 3½ feet; clayey subsoil.	Severe: slope is 30 to 65 percent; bedrock at a depth of less than 3½ feet.	Severe: slope is 30 to 65 percent; surface rockiness.
FcD For Opequon part, see Opequon series; Rock outcrop part is too variable to estimate.	Severe: bedrock at a depth of less than 3½ feet; slope is 12 to 30 percent.	Severe: bedrock at a depth of less than 3½ feet; clayey subsoil; slope is 12 to 30 percent.	Severe: bedrock at a depth of less than 3½ feet; slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.
Frederick:				
FdB	Slight	Severe: clayey subsoil.	Moderate: moderate shrink-swell potential; ML or CL material.	Moderate: moderate shrink-swell potential; ML or CL material.
FdC	Moderate: slope is 6 to 12 percent.	Severe: clayey subsoil.	Moderate: moderate shrink-swell potential; slope is 6 to 12 percent; ML or CL material.	Moderate: moderate shrink-swell potential; slope is 6 to 12 percent; ML or CL material.
FdD	Severe: slope is 12 to 20 percent.	Severe: clayey subsoil; slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.

in town and country planning—Continued

Estimated degree of soil limitations for—Continued					
Sanitary landfill [1] (trench type)	Local roads and streets	Camp areas	Playgrounds	Picnic areas	Paths and trails
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Moderate: occasional flooding.	Moderate: occasional flooding.
Severe: bedrock at a depth of less than 1½ feet.	Severe: bedrock at a depth of less than 1½ feet; slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent; bedrock at a depth of less than 1½ feet.	Severe: slope is 12 to 20 percent.	Moderate: slope is 12 to 20 percent.
Moderate: clay loam subsoil; moderately well drained.	Moderate: ML or CL soil material; seasonal water table at a depth of 1½ to 2 feet.	Moderate: moderately well drained.	Moderate: moderately well drained; slope is 1 to 6 percent.	Slight	Slight.
Moderate: silty clay loam subsoil.	Moderate: CL–ML soil material.	Slight	Moderate: slope is 2 to 6 percent.	Slight	Slight.
Moderate: silty clay loam subsoil.	Moderate: CL–ML soil material; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Moderate: subject to occasional flooding.	Moderate: subject to occasional flooding.
Severe: slope is 40 to 75 percent; rocky; bedrock at a depth of less than 3½ feet.	Severe: slope is 40 to 75 percent; rocky.	Severe: slope is 40 to 75 percent.	Severe: slope is 40 to 75 percent; rocky.	Severe: slope is 40 to 75 percent.	Severe: slope is 40 to 75 percent.
Severe: slope is 30 to 65 percent; bedrock at a depth of less than 3½ feet; clayey subsoil.	Severe: slope is 30 to 65 percent; bedrock at a depth of less than 3½ feet.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.	Severe: slope is 30 to 65 percent.
Severe: bedrock at a depth of less than 3½ feet; clayey subsoil.	Severe: slope is 12 to 30 percent; bedrock at a depth of less than 3½ feet.	Severe: slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.
Severe: clayey subsoil.	Moderate: CL material in places; moderate shrink-swell potential.	Slight	Moderate: slope is 2 to 6 percent.	Slight	Slight.
Severe: clayey subsoil.	Moderate: CL material in places; moderate shrink-swell potential; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Severe: clayey subsoil.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Moderate: slope is 12 to 20 percent.

TABLE 8.—*Limitations of soils to consider*

Soil series and map symbols	Estimated degree of soil limitations for—			
	Septic tank absorption fields	Shallow excavations	Dwellings	
			With basement	Without basement
Frederick: Cont FhD3	Severe: slope is 12 to 20 percent.	Severe: clayey subsoil; slopes 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.
Hagerstown: Hagerstown part of CcD. Mapped only in complex with Caneyville soils.	Moderate to severe: slope is 6 to 20 percent; bedrock at a depth of less than 6 feet; rocky.	Severe: clayey subsoil; rocky; slope is 6 to 20 percent.	Severe: slope is 6 to 20 percent; rocky.	Severe: slope is 6 to 20 percent; rocky.
Hagerstown part of CcE. Mapped only in complex with Caneyville soils.	Severe: slope is 20 to 30 percent; rocky; bedrock at a depth of less than 4 feet in places.	Severe: slope is 20 to 30 percent; rocky.	Severe: slope is 20 to 30 percent; rocky.	Severe: slope is 20 to 30 percent; rocky.
*Jefferson: JIF. For Latham part, see Latham series.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.
*Latham: Latham part of JIF	Severe: slope is 25 to 40 percent; slow permeability.	Severe: slope is 25 to 40 percent; clayey subsoil.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.
LbB	Severe: slow permeability.	Severe: clayey subsoil.	Moderate: moderate shrink-swell potential; CL material.	Moderate: moderate shrink-swell potential; CL material.
LbC	Severe: slow permeability.	Severe: clayey subsoil.	Moderate: moderate shrink-swell potential; CL material; slope is 6 to 12 percent.	Moderate: moderate shrink-swell potential; CL material; slope of 6 to 12 percent.
LbD, LdD3, LhD. For Lily part of LhD, see unit LsD of Lily series.	Severe: slow permeability; slope is 6 to 20 percent.	Severe: clayey subsoil; slope is 6 to 20 percent.	Moderate where slope is 6 to 12 percent; moderate shrink-swell potential; CL material. Severe where slope is more than 12 percent.	Moderate where slope is 6 to 12 percent; moderate shrink-swell potential; CL material. Severe where slope is more than 12 percent.
Latham part of SdE and SdF.	Severe: slope is 20 to 50 percent; slow permeability.	Severe: slope is 20 to 50 percent; clayey subsoil.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
*Lily: LlB	Severe: bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet.	Moderate: bedrock at a depth of 1½ to 3½ feet.

in town and country planning—Continued

Estimated degree of soil limitations for—Continued					
Sanitary landfill [1] (trench type)	Local roads and streets	Camp areas	Playgrounds	Picnic areas	Paths and trails
Severe: clayey subsoil.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Moderate: silty clay loam surface layer; slope is 12 to 20 percent.
Severe: clayey subsoil; bedrock at a depth of less than 6 feet.	Severe: rocky; slope is 6 to 20 percent.	Severe: slope is 6 to 20 percent.	Severe: slope is 6 to 20 percent; rocky.	Severe: slope is 6 to 20 percent.	Moderate: rocky; slope is 6 to 20 percent.
Severe: clayey subsoil; bedrock at a depth of less than 6 feet; slope is more than 20 percent.	Severe: rocky; slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent; rocky.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.
Severe: permeability is more than 2 inches per hour; slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.
Severe: slope is 25 to 40 percent; clayey subsoil.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.	Severe: slope is 25 to 40 percent.
Severe: clayey subsoil.	Moderate: CL material; moderate shrink-swell potential.	Moderate: slow permeability.	Moderate: slow permeability; slope is 2 to 6 percent.	Slight	Slight.
Severe: clayey subsoil.	Moderate: CL material; slope is 6 to 12 percent; moderate shrink-swell potential.	Moderate: slow permeability; slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Severe: clayey subsoil.	Moderate where slope is 6 to 12 percent; moderate shrink-swell potential; CL material. Severe where slope is more than 12 percent.	Moderate where slope is 6 to 12 percent; slow permeability. Severe where slope is more than 12 percent.	Severe: slope is 6 to 20 percent.	Moderate where slope is 6 to 12 percent. Severe where slope is more than 12 percent.	Slight where slope is 6 to 12 percent. Moderate where slope is 12 to 20 percent.
Severe: slope is more than 25 percent in places; clayey subsoil.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
Severe: permeability is more than 2 inches per hour; bedrock at a depth of less than 3½ feet.	Moderate: bedrock at a depth of less than 3½ feet.	Slight	Moderate: slope is 2 to 6 percent; bedrock at a depth of 1½ to 3½ feet.	Slight	Slight.

TABLE 8.—*Limitations of soils to consider*

Soil series and map symbols	Estimated degree of soil limitations for—			
	Septic tank absorption fields	Shallow excavations	Dwellings	
			With basement	Without basement
Lily: Cont				
LIC	Severe: bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet.	Moderate: bedrock at a depth of 1½ to 3½ feet; slope is 6 to 12 percent.
LsD	Severe: bedrock at a depth of less than 3½ feet; slope is 6 to 20 percent.	Severe: bedrock at a depth of less than 3½ feet; slope is 6 to 20 percent.	Severe: bedrock at a depth of less than 3½ feet; slope is 6 to 20 percent.	Moderate to severe: slope is 6 to 20 percent; bedrock at a depth of 1½ to 3½ feet.
LtE For Steinsburg part, see unit SlF of Steinsburg series.	Severe: slope is 20 to 30 percent; bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet; slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent; bedrock at a depth of less than 3½ feet.	Severe: slope is 20 to 30 percent.
Lindside: Lv	Severe: seasonal water table at a depth of less than 2 feet; subject to flooding.	Severe: moderately well drained; subject to flooding.	Severe: seasonal water table at a depth of less than 2 feet; subject to flooding.	Severe: subject to flooding.
Morehead: Mo	Severe: seasonal water table at a depth of less than 2 feet.	Moderate: moderately well drained.	Severe: seasonal water table at a depth of less than 2 feet.	Moderate: moderately well drained; ML or CL material.
Morehead variant: Mv	Severe: seasonal water table at a depth of less than 1½ feet.	Severe: somewhat poorly drained.	Severe: somewhat poorly drained; seasonal water table at a depth of less than 1½ feet.	Moderate: somewhat poorly drained; seasonal water table at a depth of less than 1½ feet; ML or CL material.
Newark: Nd	Severe: seasonal water table at a depth of less than 1½ feet; subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Severe: somewhat poorly drained; seasonal water table at a depth of less than 1½ feet; subject to flooding.	Severe: subject to flooding.
Newark variant: Ng	Severe: seasonal water table at a depth of less than 1½ feet; subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Severe: somewhat poorly drained; seasonal water table at a depth of less than 1½ feet; subject to flooding.	Severe: subject to flooding.
Nolin: No	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Opequon: Mapped only in complex with Faywood soils.	Severe: bedrock at a depth of less than 1½ feet; slope is 12 to 30 percent.	Severe: bedrock at a depth of less than 1½ feet; slope is 12 to 30 percent.	Severe: bedrock at a depth of less than 1½ feet; high shrink-swell potential; slope is 12 to 30 percent.	Severe: bedrock at a depth of less than 1½ feet; high shrink-swell potential; slope is 12 to 30 percent.

in town and country planning—Continued

Estimated degree of soil limitations for—Continued					
Sanitary landfill [1] (trench type)	Local roads and streets	Camp areas	Playgrounds	Picnic areas	Paths and trails
Severe: permeability is more than 2 inches per hour; bedrock at a depth of less than 3½ feet.	Moderate: bedrock at a depth of less than 3½ feet; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Severe: permeability is more than 2 inches per hour; bedrock at a depth of less than 3½ feet.	Moderate where slope is 6 to 12 percent; bedrock at a depth of less than 3½ feet. Severe where slope is more than 12 percent.	Moderate where slope is 6 to 12 percent. Severe where slope is more than 12 percent.	Severe: slope is 6 to 20 percent.	Moderate where slope is 6 to 12 percent. Severe where slope is more than 12 percent.	Moderate where slope is more than 15 percent. Slight where slope is 6 to 12 percent.
Severe: permeability is more than 2 inches per hour; bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet; slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Moderate: subject to occasional flooding.	Moderate: subject to occasional flooding.
Moderate: moderately well drained.	Moderate: ML or CL material; seasonal water table at a depth of less than 2 feet.	Moderate: moderately well drained.	Slight	Slight	Slight.
Severe: somewhat poorly drained.	Moderate: ML or CL material; seasonal water table at a depth of less than 1½ feet.	Severe: somewhat poorly drained.	Severe: somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Severe: somewhat poorly drained; subject to flooding.	Severe: subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Moderate: somewhat poorly drained; occasional flooding.	Moderate: somewhat poorly drained; occasional flooding.
Severe: somewhat poorly drained; subject to flooding.	Severe: subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Severe: somewhat poorly drained; subject to flooding; generally more than 20 percent coarse fragments.	Moderate: somewhat poorly drained; occasional flooding; generally more than 20 percent coarse fragments.	Moderate: somewhat poorly drained; occasional flooding; generally more than 20 percent coarse fragments.
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Moderate: occasional flooding.	Moderate: occasional flooding.
Severe: bedrock at a depth of less than 1½ feet; clayey subsoil.	Severe: bedrock at a depth of less than 1½ feet; high shrink-swell potential; slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.	Severe: slope is 12 to 30 percent.

TABLE 8.—*Limitations of soils to consider*

Soil series and map symbols	Estimated degree of soil limitations for—			
	Septic tank absorption fields	Shallow excavations	Dwellings	
			With basement	Without basement
Pope: Po	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Rigley: RgF	Severe: slope is 30 to 60 percent; stoniness.	Severe: slope is 30 to 60 percent; stoniness.	Severe: slope is 30 to 60 percent; stoniness.	Severe: slope is 30 to 60 percent; stoniness.
Rigley part of SgE and SgF.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
*Shelocta: Shelocta part of CdD	Severe: rocky; slope is generally more than 12 percent.	Severe: rocky; slope is generally more than 12 percent.	Severe: rocky; slope is generally more than 12 percent.	Severe: rocky; slope is generally more than 12 percent.
Shelocta part of CdE	Severe: slope is 20 to 30 percent; rocky.	Severe: slope is 20 to 30 percent; rocky.	Severe: slope is 20 to 30 percent; rocky.	Severe: slope is 20 to 30 percent; rocky.
SbC	Moderate: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent; gravelly.	Moderate: slope is 6 to 12 percent; ML or CL material.	Moderate: slope is 6 to 12 percent; ML or CL material.
SbD, SdD For Latham part of SdD, see unit LdD of Latham series.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.
SbE, ScF, SdE, SdF For Latham part of SdE and SdF, see Latham series.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
SgE, SgF For Rigley part, see Rigley series.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
Steff: Sh	Severe: seasonal water table at a depth of less than 2 feet; subject to flooding.	Severe: moderately well drained; subject to flooding.	Severe: seasonal water table at a depth of less than 2 feet; subject to flooding.	Severe: subject to flooding.
Steinsburg: SkC	Severe: bedrock at a depth of less than 3½ feet.	Severe: bedrock at a depth of generally less than 3½ feet.	Severe: bedrock at a depth of less than 3½ feet.	Moderate: slope is 6 to 12 percent; bedrock at a depth of 1½ to 3½ feet.

in town and country planning—Continued

Estimated degree of soil limitations for—Continued					
Sanitary landfill [1] (trench type)	Local roads and streets	Camp areas	Playgrounds	Picnic areas	Paths and trails
Severe: subject to flooding; permeability is more than 2 inches per hour.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Moderate: occasional flooding.	Moderate: occasional flooding.
Severe: permeability is more than 2 inches per hour; slope is 30 to 60 percent; stoniness.	Severe: slope is 30 to 60 percent; stoniness.	Severe: slope is 30 to 60 percent; stoniness.	Severe: slope is 30 to 60 percent; stoniness.	Severe: slope is 30 to 60 percent.	Severe: slope is 30 to 60 percent; stoniness.
Severe: permeability is more than 2 inches per hour; slope is more than 20 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
Severe: rocky ----	Severe: slope is generally more than 12 percent.	Severe: slope is generally more than 12 percent.	Severe: slope is 6 to 20 percent.	Severe: slope is generally more than 12 percent.	Moderate: rocky; slope is 6 to 20 percent.
Severe: rocky; slope is more than 25 percent in places.	Severe: slope is 20 to 30 percent; rocky.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.	Severe: slope is 20 to 30 percent.
Slight ----------	Moderate: ML or CL material; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent; gravelly.	Severe: slope is 6 to 12 percent; gravelly.	Moderate: slope is 6 to 12 percent; gravelly.	Slight.
Moderate: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Moderate: slope is 12 to 20 percent.
Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Moderate: occasional flooding.	Moderate: occasional flooding.
Severe: bedrock at a depth of less than 6 feet; permeability is more than 2 inches per hour.	Moderate: bedrock at a depth of less than 1½ to 3½ feet; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.

TABLE 8.—*Limitations of soils to consider*

Soil series and map symbols	Estimated degree of soil limitations for—			
	Septic tank absorption fields	Shallow excavations	Dwellings	
			With basement	Without basement
Steinsburg: Continued				
SID	Severe: bedrock at a depth of less than 4 feet; slope is more than 12 percent.	Severe: bedrock at a depth of generally less than 3 feet; slope is more than 12 percent.	Severe: bedrock at a depth of less than 3½ feet; slope is more than 12 percent.	Severe: slope is more than 12 percent.
SIF	Severe: bedrock at a depth of less than 4 feet; slope is 20 to 50 percent.	Severe: bedrock at a depth of generally less than 3 feet; slope is 20 to 50 percent.	Severe: bedrock at a depth of less than 3½ feet; slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
Stendal				
Sn, Ss	Severe: seasonal water table at a depth of less than 1½ feet; subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Severe: somewhat poorly drained; seasonal water table at a depth of less than 1½ feet; subject to flooding.	Severe: subject to flooding.
So	Severe: seasonal water table at a depth of less than 1½ feet.	Severe: somewhat poorly drained.	Severe: somewhat poorly drained; seasonal water table at a depth of less than 1½ feet.	Moderate: somewhat poorly drained; seasonal water table at a depth of less than 1½ feet.
Tilsit:				
TlB	Severe: slow permeability.	Moderate: bedrock at a depth of less than 5 feet in places; moderately well drained.	Severe: seasonal water table at a depth of less than 2 feet.	Moderate: seasonal water table at a depth of 1½ to 2 feet; ML or CL material.
TlC	Severe: slow permeability.	Moderate: bedrock at a depth of less than 5 feet in places; slope is 6 to 12 percent; moderately well drained.	Severe: seasonal water table at a depth of less than 2 feet.	Moderate: seasonal water table at a depth of 1½ to 2 feet; slope is 6 to 12 percent; ML or CL material.
Weikert: WcF	Severe: slope is 40 to 80 percent; bedrock at a depth of less than 1½ feet.	Severe: slope is 40 to 80 percent; bedrock at a depth of less than 1½ feet.	Severe: slope is 40 to 80 percent; bedrock at a depth of less than 1½ feet.	Severe: slope is 40 to 80 percent; bedrock at a depth of less than 1½ feet.
Whitley:				
WhB	Moderate: bedrock generally at a depth of less than 6 feet.	Moderate: bedrock generally at a depth of less than 6 feet.	Moderate: ML or CL material; bedrock at a depth of less than 5 feet in places.	Moderate: ML or CL material.
WhC	Moderate: bedrock at a depth of generally less than 6 feet; slope is 6 to 12 percent.	Moderate: bedrock at a depth of generally less than 6 feet; slope is 6 to 12 percent.	Moderate: ML or CL material; slope is 6 to 12 percent.	Moderate: ML or CL material; slope is 6 to 12 percent.
WhD	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.

in town and country planning—Continued

Estimated degree of soil limitations for—Continued					
Sanitary landfill [1] (trench type)	Local roads and streets	Camp areas	Playgrounds	Picnic areas	Paths and trails
Severe: bedrock at a depth of less than 6 feet; permeability is more than 2 inches per hour.	Severe: bedrock at a depth of 1½ to 3½ feet; slope is more than 15 percent in most places.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Moderate: slope is 12 to 20 percent.
Severe: bedrock at a depth of less than 6 feet; permeability is more than 2 inches per hour.	Severe: bedrock at a depth of less than 1½ to 3½ feet; slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.	Severe: slope is 20 to 50 percent.
Severe: somewhat poorly drained; subject to flooding.	Severe: subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Severe: somewhat poorly drained; subject to flooding.	Moderate: somewhat poorly drained; occasional flooding.	Moderate: somewhat poorly drained; occasional flooding.
Severe: somewhat poorly drained.	Moderate: seasonal water table at a depth of less than 1½ feet.	Severe: somewhat poorly drained.	Severe: somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Severe: bedrock generally at a depth of less than 6 feet.	Moderate: ML or CL material; seasonal water table at a depth of less than 2 feet.	Moderate: slow permeability.	Moderate: slow permeability; slope is 2 to 6 percent.	Slight	Slight.
Severe: bedrock generally at a depth of less than 6 feet.	Moderate: slope is 6 to 12 percent; ML or CL material.	Moderate: slow permeability; slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Severe: slope is 40 to 80 percent; bedrock at a depth of less than 1½ feet.	Severe: slope is 40 to 80 percent; bedrock at a depth of less than 1½ feet.	Severe: slope is 40 to 80 percent.	Severe: slope is 40 to 80 percent.	Severe: slope is 40 to 80 percent.	Severe: slope is 40 to 80 percent.
Severe: bedrock generally at a depth of less than 6 feet.	Moderate: ML or CL materi[illegible]	Slight	Moderate: slope is 2 to 6 percent.	Slight	Slight.
Severe: bedrock generally at a depth of less than 6 feet.	Moderate: ML or CL material; slope is 6 to 12 percent.	Moderate: slope 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.
Severe: bedrock generally at a depth of less than 6 feet.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Severe: slope is 12 to 20 percent.	Moderate: slope is 12 to 20 percent.

TABLE 8.—*Limitations of soils to consider*

Soil series and map symbols	Estimated degree of soil limitations for—			
	Septic tank absorption fields	Shallow excavations	Dwellings	
			With basement	Without basement
Whitley: Continued				
WtA	Slight to severe: subject to infrequent flooding in places.	Moderate: subject to infrequent flooding in places.	Moderate to severe: ML or CL material; subject to infrequent flooding in places.	Moderate to severe: ML or CL material; subject to infrequent flooding in places.
WtB	Slight to severe: subject to infrequent flooding in places.	Moderate: subject to infrequent flooding in places.	Moderate to severe: ML or CL material; subject to infrequent flooding in places.	Moderate to severe: ML or CL material; subject to infrequent flooding in places.
WtC	Moderate: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Moderate: ML or CL material; slope is 6 to 12 percent.	Moderate: ML or CL material; slope is 6 to 12 percent.

[1] Onsite studies of the underlying strata, water tables, and hazards of aquifer pollution and drainage into ground water need

Morphology of Soils

Horizon nomenclature and the processes involved in horizon development are described briefly in this section.

Major soil horizons

The results of the factors of soil formation can be distinguished by the different layers, or soil horizons, seen in a soil profile. The soil profile extends from the surface of the soil down to material that has been little altered by the soil forming processes.

Most soils contain three major horizons called A, B, and C (*8*). These major horizons may be further subdivided by the use of numbers and letters to indicate changes within one horizon. An example is the B2t horizon, which represents a B horizon that contains an accumulation of clay.

The A horizon is the surface layer. An A1 horizon is that part of the surface layer that has the largest accumulation of organic matter. The A2 horizon is the part of the surface layer that has maximum leaching or eluviation of clay and iron. If the land has been plowed, the surface layer is designated Ap.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils the B horizon formed by alteration in place rather than by illuviation. The alteration may be caused by oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has blocky structure. It generally is firmer and lighter colored than the A1 horizon, but is darker colored than the C horizon.

The C horizon is below the A or B horizon. It consists of materials that are little altered by the soil forming processes but in places are modified by weathering.

Processes of soil horizon differentiation

In Laurel and Rockcastle Counties, several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes are continually taking place and generally at the same time throughout the profile. Such processes have been going on for thousands of years.

The accumulation and incorporation of organic matter takes place with the decomposition of plant residue. These additions darken the surface layer and help to form the A1 horizon. Organic matter, once lost, normally takes a long time to replace. In Laurel and Rockcastle Counties, the organic matter content of the plowed surface layer averages about 2 percent.

In soils that have distinct subsoil horizons, it is believed that some of the lime and other soluble salts are leached before the translocation of clay minerals. Among the factors that affect this leaching are the kinds of salts originally present, the depth to which the soil solution percolates, and the texture of the material in the soil profile. Well drained and moderately well drained soils such as Shelocta and Latham have a yellowish brown to yellowish red subsoil. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains.

A fragipan has developed in the subsoil of some of the moderately well drained soils in the survey area. The material in this horizon is very firm and brittle when moist and very hard when dry. Soil particles are so tightly packed that bulk density is high and pore space is low. The genesis of this horizon is not fully understood, but studies show that swelling and shrinking take place in alternating wet and dry periods. This may account for the packing of soil particles and for

in town and country planning—Continued

Estimated degree of soil limitations for—Continued					
Sanitary landfill [1] (trench type)	Local roads and streets	Camp areas	Playgrounds	Picnic areas	Paths and trails
Slight to severe: subject to infrequent flooding in places.	Moderate: ML or CL material.	Slight	Slight	Slight	Slight.
Slight to severe: subject to infrequent flooding in places.	Moderate: ML or CL material.	Slight	Moderate: slope is 2 to 6 percent.	Slight	Slight.
Moderate: silty clay loam subsoil.	Moderate: ML or CL material; slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Severe: slope is 6 to 12 percent.	Moderate: slope is 6 to 12 percent.	Slight.

to be made for landfills deeper than 5 or 6 feet.

the gross polygonal pattern of cracks in the fragipan. Clay, silica, and oxides of aluminum are the cementing agents that most likely cause brittleness and hardness. Bedford and Tilsit soils are examples of soils that have a fragipan.

The reduction and transfer of iron is associated mainly with the wetter, more poorly drained soils. This process is called gleying. Somewhat poorly drained soils such as Stendal have yellowish brown mottles, which indicate the segregation of iron. In poorly drained soils such as Bonnie, the subsoil and underlying material are grayish, which indicates reduction and transfer of iron by removal in solution.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In table 9 the soil series of Laurel and Rockcastle Counties are placed in four categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in sol (En-ti-sol).

SUBORDER. Each order is subdivided into suborders that are based mainly on those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of water-logging, or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquent* (*Aqu,* meaning water or wet, and *ent,* from Entisol).

GREAT GROUP. Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark colored surface horizons. The features used are the self mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, so-

TABLE 9.—*Soil series classified according to the current system of classification*

Series	Current classification		
	Family	Subgroup	Order
Allegheny	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Bedford	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols.
Berea	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols.
Bonnie	Fine-silty, mixed, acid, mesic	Typic Fluvaquents	Entisols.
Britwater	Fine-loamy, mixed, mesic	Typic Paleudalfs	Alfisols.
Brookside	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Caneyville	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Chagrin	Fine-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts	Inceptisols.
Colyer variant	Loamy, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Cotaco	Fine-loamy, mixed, mesic	Aquic Hapludults	Ultisols.
Crider	Fine-silty, mixed, mesic	Typic Paleudalfs	Alfisols.
Cuba	Fine-silty, mixed, mesic	Fluventic Dystrochrepts	Inceptisols.
Donahue	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Faywood	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Frederick	Clayey, kaolinitic, mesic	Typic Paleudults	Ultisols.
Hagerstown	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Jefferson	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols.
Latham	Clayey, mixed, mesic	Aquic Hapludults	Ultisols.
Lily	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols.
Lindside	Fine-silty, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Morehead	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols.
Morehead variant	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols.
Newark	Fine-silty, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols.
Newark variant	Fine-silty, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols.
Nolin	Fine-silty, mixed, mesic	Dystric Fluventic Eutrochrepts	Inceptisols.
Opequon	Clayey, mixed, mesic	Lithic Hapludalfs	Alfisols.
Pope	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols.
Rigley	Coarse-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Shelocta	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Steff	Fine-silty, mixed, mesic	Fluvaquentic Dystrochrepts	Inceptisols.
Steinsburg[1]	Coarse-loamy, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Stendal	Fine-silty, mixed, acid, mesic	Aeric Fluvaquents	Entisols.
Stendal variant	Coarse-loamy, mixed, acid, mesic	Aeric Fluvaquents	Entisols.
Strip mines		Orthents and Ochrepts	Entisols and Inceptisols.
Tilsit	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols.
Weikert	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Whitley	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols.

[1] These soils have a thicker solum than is defined for the Steinsburg series and are taxadjuncts to the series.

dium, and potassium), dark red and dark brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Fluvaquents (*Fluv,* meaning flood, *aqu* for wetness or water, and *ent,* from Entisol).

SUBGROUP. Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Fluvaquents (a typical Fluvaquent).

FAMILY. Soil families are separated within a subgroup mainly on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae (table 9). An example is the fine-silty, mixed, acid, mesic family of Typic Fluvaquents.

General Nature of the Area[5]

Described briefly in this section are the history, geology, relief, drainage, farming, industry, transpor-

[5] ALBERT S. JOHNSON, soil scientist, Soil Conservation Service, assisted in the preparation of this section.

tation, markets, and water supply of Laurel and Rockcastle Counties.

History

Dr. Thomas Walker explored parts of both Laurel and Rockcastle Counties during his expedition in 1750. Daniel Boone laid out Boone Trace through both counties in 1775. Laurel County was formed in 1825. It was named for the Laurel River, which was named for the beautiful flowering shrub, mountain laurel, so common along its banks. Rockcastle County was formed in 1810 and named for Castle Rock near Livingston. Mount Vernon is the county seat of Rockcastle County, and London is the county seat of Laurel County.

In the past, industry was centered around farming and the production of coal and timber; but coal and timber, especially timber, have declined somewhat in importance in recent years. Many saltpeter caves are in Rockcastle County, and large quantities of saltpeter were manufactured during the war of 1812. This industry is now dormant. The main industry in the survey area is farming, but the area is the center of a growing industrial community, especially in Laurel County, where in 1969 there were about 1,100 manufacturing jobs.

Geology

The survey area lies within three of the major physiographic regions of Kentucky. The northwestern part of Rockcastle County lies within the Knob Region, and the southwestern and central parts lie within the Eastern Pennyroyal Region. The eastern and southern parts of Rockcastle County and all of Laurel County lie within the Mountain and Eastern Coal Field Region.

The Knob Region in Rockcastle County is underlain mainly by the Nancy Member of the Borden Formation of the Mississippian System. Along Copper Creek, it is underlain by the New Albany Shale of the Devonian System. Two siltstone members intrude into the Nancy Shale and have a marked local influence. The Gum Sulphur Bed outcrops above Copper Creek and Brodhead, and the Cowbell Member outcrops in the Roundstone Creek Valley. Both of these siltstone members create prominent escarpments on the side slopes of lower valleys.

The Eastern Pennyroyal Region in Rockcastle County is in two areas. South of Brodhead and on scattered low ridges in other areas, the soils are underlain by the Renfro, Wildie, and Halls Gap Members of the Borden Formation. These members contain more siltstone and sandstone than the underlying clay shale or the overlying limestone. In the central part of Rockcastle County, the soils are underlain by three members of Newman Limestone of the upper Mississippian System. Throughout this area, the tallest knobs are capped with sandstone and shale of the Lee Formation of the Pennsylvanian System. These tall knobs are closer together in the eastern part of the Eastern Pennyroyal Region than in the western part.

The Mountain and Eastern Coal Field Region is a part of the Cumberland Plateau. The soils in this area are underlain by siltstone, sandstone, and shale of the Pennsylvanian System. Some of the deepest valleys, mostly in the eastern part of Rockcastle County, penetrate into the Upper Mississippian Limestone.

Relief and Drainage

Relief and other topographic features are related to resistance to weathering of the various geologic formations.

In the Knob Region the soft clay shale weathers rapidly and forms rounded land forms; the siltstone weathers slowly. The Knob Region is drained by natural streams.

The Lower Pennyroyal Region, underlain by members of the Borden Formation, is a dissected plateau that has steep side slopes along natural drains. The rest of the Pennyroyal Region is underlain by cavernous Newman Limestone. Much of the surface water finds its way into underground water channels through sinkholes and depressions, and this results in karst topography.

The Mountain and Eastern Coal Field Region of eastern Rockcastle County and Laurel County is a dissected plateau. Generally the landscape is rugged and has narrow ridges, steep side slopes, and V-shaped valleys that have massive sandstone cliffs on each side of all streams as Lake Cumberland is approached. The major exception to the rugged landscape is the central part of Laurel County, where slopes are generally more gentle.

The elevation in Laurel County ranges from 723 feet above sea level, the normal pool stage of Lake Cumberland in the southwestern corner of the county, to about 1,730 feet on a peak on the Knox County line near Blackwater. The lowest point in Rockcastle County is about 800 feet above sea level in the Rockcastle River at the southern tip of the county. Where the Dix River flows into Lincoln County, the elevation is about 880 feet. The highest point in Rockcastle County is about 1,600 feet on a peak on the Madison County line near the Macedonia Church.

The headwater of the Dix River rises near Brodhead in Rockcastle County. Copper Creek flows into the Dix River a short distance into Lincoln County. These two streams flow to the west and are a part of the Kentucky River watershed. The rest of Rockcastle County and all of Laurel County drain into the Cumberland River system.

Farming

Both Laurel and Rockcastle Counties are mainly rural. The farms are small, and most are operated by the owner. According to the U.S. Census of Agriculture, the average size of the farms in Laurel County in 1969 was 69 acres and, in Rockcastle County, 109 acres. There were 1,706 farms in Laurel County and 1,164 farms in Rockcastle County. The average value per acre of land and buildings in Laurel County was $285, and in Rockcastle County, $160.

Farming in both counties is diversified. Income from livestock and livestock products slightly exceeds income from crops in most years. Tobacco is the most important cash crop. Much of the farm produce is needed for domestic use and is used by the farm family or fed to livestock.

The following list shows the market value of products sold in 1969:

Products Sold	Laurel County	Rockcastle County
All Products	$5,496,587	$4,049,708
Livestock, Poultry, and their Products	3,237,068	1,975,237
Farm Crops	2,229,307	2,041,268
Tobacco	1,164,106	1,212,808
Forest Products	30,212	33,203

Industry, Transportation, and Markets

Although most of the survey area is rural, industry has become important in the area in recent years. London and North Corbin in Laurel County are centers of industrial growth, and many jobs are provided for workers in Laurel County and nearby counties. Factories produce greeting cards, fertilizer, woolen material, and clothing; milk products are processed and packed; and a regional bakery is located in London. Some timber is harvested, logs are sawed into lumber, and some coal is strip mined in both Laurel and Rockcastle Counties.

Interstate 75 traverses both counties. It parallels U.S. Highway 25, which runs north and south. These roads form the major highways to Cincinnati, Ohio and Knoxville, Tennessee, and points beyond. The Daniel Boone Parkway, a toll road, extends east from London. Many other good state roads are in the two counties.

A major north-south branch of the Louisville and Nashville Railroad system passes through both counties and has sidings at several convenient locations. Near Livingston in Rockcastle County, the Louisville connecting road branches off the main line and passes through Mount Vernon and Brodhead.

The London-Corbin Airport, just south of London, has the only scheduled commercial air passenger flights in the southeastern part of Kentucky.

London and Mount Vernon have active markets for bell peppers and cucumbers. London also has a burley tobacco market.

Laurel County borders Lake Cumberland and Laurel River Reservoir, both of which were built by the U.S. Army Corps of Engineers. Levi Jackson State Park near London and Renfro Valley near Mount Vernon attract many tourists. With all the recreation facilities and motels in the area, tourism is a significant and growing industry.

Water Supply

In the past, wells, cisterns, and springs supplied most of the water for rural household use in Laurel and Rockcastle Counties. Now, however, the Laurel County rural water districts are serving most households along most major roads. Rockcastle County has also made progress in forming rural water districts. Reservoirs have been built to furnish the water districts.

The many creeks and branches in the counties provide livestock water for much of the year. To supplement this supply, Laurel County farmers have constructed more than 1,000 ponds and developed about 30 springs for livestock water. Similarly, the farmers in Rockcastle County have constructed more than 500 ponds and developed more than 250 springs.

Climate[6]

The climate of Laurel and Rockcastle Counties is temperate, having moderately cold winters and warm, humid summers. Temperature, rainfall, and humidity remain within limits agreeable to man and are suitable for various kinds of plant and animal life. All seasons are marked by weather changes that come from passing weather fronts and associated centers of high and low pressure. This weather activity is least frequent late in spring and in summer, somewhat more frequent in fall, and most frequent in winter and early in spring. Temperatures vary from the average least during the period of minimum activity and most during the period of maximum activity.

Precipitation is fairly well distributed throughout the year, but October generally has the least rainfall. Annual free water evaporation from shallow lakes and farm ponds averages about 35 inches, about 12 inches less than the average annual precipitation. About 73 percent of this evaporation occurs during the period of May through October.

Periods of dry and wet weather do occur, as shown by the monthly precipitation for past years in table 10. According to a statistical study, for example, in 1 out of 10 years January receives less than 1.9 inches of precipitation, which is 54 percent of the average precipitation. In 1 out of 10 years, however, January also receives more than 10 inches of precipitation, which is 2.8 times the average.

A statistical study of heavy precipitation received in this area in just a few hours indicates the probability of occurrence of totals at least as great as those listed below:

Frequency in 100 years	Inches in 1 hour	6 hours	12 hours
1	2.9	4.6	5.5
4	2.4	3.8	4.5
20	1.8	2.9	3.5
100	1.2	2.0	2.4

Snowfall varies greatly from year to year. The greatest annual total recorded for the period of this summary was 60 inches in 1960; the least recorded, 8.7 inches in 1957. Thunderstorms occur on an average of about 50 days a year. They are most frequent in spring and summer, but can occur in any month. They account for most of the short duration, high intensity rainfall indicated in the preceding list.

Winds, relative humidity, and sunshine records are not available for this location, but estimates for these elements are possible from data from stations in surrounding areas. Winds blow most frequently from the south or southwest. Windspeeds average 6 to 8 miles per hour from June through October and 9 to 11 miles per hour from November through May. The rise and fall in relative humidity is opposite to that of temperature during a typical day. The highest humidity generally occurs with the lowest temperature of the day, and the lowest humidity generally occurs with the high-

[6] By ALLEN B. ELAM, JR., climatologist for Kentucky National Weather Service, National Oceanic and Atmospheric Administration.

TABLE 10.—*Temperature and precipitation*

[Data from London, Laurel County. Period of record 1955–68]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average monthly highest maximum	Average monthly lowest minimum	Average monthly total	One year in 10 will have—		Days with snow [2]	Average depth of snow on days with snow cover [2]
						Less than [1]—	More than [1]—		
	°F	°F	°F	°F	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
January	42	23	65	−2	3.5	1.9	10.0	6	3
February	46	25	67	2	4.5	1.6	8.3	5	3
March	56	33	76	16	5.3	2.3	7.5	2	5
April	68	43	85	27	4.4	1.7	6.1	([3])	1
May	77	52	87	35	3.9	1.6	7.0	0	0
June	82	59	90	49	3.8	1.9	6.6	0	0
July	85	63	91	56	5.2	2.3	8.5	0	0
August	84	62	92	50	2.9	1.3	5.7	0	0
September	79	55	90	40	3.4	0.8	5.2	0	0
October	69	42	82	26	2.4	0.6	4.3	0	0
November	57	33	74	16	3.3	1.2	6.8	1	2
December	46	26	66	4	4.0	1.8	7.2	4	2
Year	66	43	[4] 93	[5] −6	46.6	39.9	57.0	18	3

[1] Estimates, based on short London record and other data.
[2] One inch or more.
[3] Less than ½ day.
[4] Average annual highest maximum.
[5] Average annual lowest minimum.

TABLE 11.—*Probabilities of last freezing temperatures in spring and first in fall*

[All data from London, Laurel County]

Probability	Dates for given probability and temperature [1]				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than	March 22	April 4	April 9	April 30	May 7
2 years in 10 later than	March 14	March 28	April 3	April 24	May 2
5 years in 10 later than	February 28	March 16	March 22	April 13	April 22
Fall:					
1 year in 10 earlier than	November 22	October 27	October 21	October 11	October 5
2 years in 10 earlier than	November 27	November 2	October 27	October 17	October 10
5 years in 10 earlier than	December 7	November 12	November 6	October 26	October 20

[1] All data are based on temperatures in a standard U. S. Weather Bureau thermometer shelter at a height of approximately 5 feet above the ground in a representative exposure. Lower temperatures will exist at times nearer the ground or in local areas subject to extreme air drainage.

est temperature. Humidity readings taken in the midseason months at 7 a.m. and 1 p.m., respectively, are as follows: January, 82 percent and 68 percent; April, 75 percent and 54 percent; July, 81 percent and 55 percent; October, 82 percent and 52 percent. The percent of possible sunshine for the midseason months averages about 40 percent in January, 56 percent in April, 65 percent in July, and 60 percent in October.

The growing season, defined as the number of days between the last freezing temperature in spring and the first in fall, averages about 181 days. The growing season is 202 days or more in 10 percent of the years, 192 days or more in 25 percent of the years, less than 170 days in 25 percent of the years, and less than 150 days in 10 percent of the years. The probabilities of freezing temperatures are given in table 11.

This area has a favorable, moderate climate, and many days of the year have a nearly ideal temperature. Fall has many mild, sunny days and is considered one of the best times of the year for outdoor activities.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Channery soil. A soil, that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse textured (light textured) soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Depth, soil. As used in this survey, soil depth refers to the vertical distance from the soil surface to bedrock. Descriptive terms and range of depths are: *deep*, more than 40 inches; *moderately deep*, 20 to 40 inches; *shallow*, less than 20 inches.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geological processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soils. Soils that contain comparatively thin fragments, 6 to 15 inches long, of sandstone or limestone. A single piece of flagstone.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes and that differs in one or more ways from adjacent horizons in the same profiles.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined

by the texture, structure, and other characteristics of the soil profile and underlying layers and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid* and *very rapid.*

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Leaching. The removal of soluble material from soil or other material by percolating water.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		pH
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Root zone. The vertical distance between the surface of the soil and any layer, such as a fragipan or bedrock, that inhibits the growth of plant roots. Descriptive terms are as follows: *very shallow,* less than 10 inches below the surface; *shallow,* 10 to 20 inches below the surface; *moderately deep,* 20 to 30 inches below the surface; and *deep,* more than 30 inches below the surface.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Second bottom. The first terrace above the normal flood plain of a stream.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope. The amount of rise or fall in feet for each 100 feet of horizonal distance. It is normally expressed in percent. The terms used in this publication are:

	Percent		Percent
Nearly level	0 to 2	Moderately steep	12 to 20
Gently sloping	2 to 6	Steep	20 to 30
Sloping	6 to 12	Very steep	more than 30

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs.

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group
			Symbol	Page	Number
A1B	Allegheny loam, 2 to 6 percent slopes	10	IIe-1	42	2o1
A1C	Allegheny loam, 6 to 12 percent slopes	10	IIIe-1	44	2o1
BdB	Bedford silt loam, 2 to 6 percent slopes	12	IIe-4	43	3w1
BgC	Berea silt loam, 6 to 12 percent slopes	13	IIIe-3	44	3w1
BgD	Berea silt loam, 12 to 20 percent slopes	13	IVe-1	44	3w1
Bn	Bonnie silt loam	14	IIIw-1	44	1w2
Bo	Bonnie silt loam, terrace	14	IIIw-1	44	1w2
BtB	Britwater cherty silt loam, 2 to 6 percent slopes	14	IIe-2	43	2o1
BtC	Britwater cherty silt loam, 6 to 12 percent slopes	14	IIIe-2	44	2o1
BxF	Brookside-Faywood-Rock outcrop complex, 30 to 65 percent slopes	15	VIIs-2	45	2x1(N) 3x1(S)
CcD	Caneyville-Hagerstown rocky silt loams, 6 to 20 percent slopes	16	VIs-1	45	3c1
CcE	Caneyville-Hagerstown rocky silt loams, 20 to 30 percent slopes	16	VIs-1	45	3c2
CdD	Caneyville-Shelocta rocky silt loams, 6 to 20 percent slopes	16	VIs-1	45	2c1
CdE	Caneyville-Shelocta rocky silt loams, 20 to 30 percent slopes	17	VIs-1	45	3c2
Cf	Chagrin loam	18	I-2	42	1o1
C1D	Colyer silt loam, silty subsoil variant, 12 to 20 percent slopes	18	VIs-2	45	4d1
Co	Cotaco loam	19	IIe-4	43	2w1
CsB	Crider silt loam, 2 to 6 percent slopes	20	IIe-2	43	1o2
CsC	Crider silt loam, 6 to 12 percent slopes	20	IIIe-2	44	1o2
Cu	Cuba silt loam	20	I-1	42	1o1
DoF	Donahue rocky sandy loam, 40 to 75 percent slopes	21	VIIe-1	45	2x1(N) 3x1(S)
FcD	Faywood-Opequon-Rock outcrop complex, 12 to 30 percent slopes	22	VIIs-2	45	2x1(N) 3x1(S)
FdB	Frederick silt loam, 2 to 6 percent slopes	23	IIe-2	43	2c1
FdC	Frederick silt loam, 6 to 12 percent slopes	23	IIIe-2	44	2c1
FdD	Frederick silt loam, 12 to 20 percent slopes	23	IVe-2	45	2c1
FhD3	Frederick silty clay loam, 12 to 20 percent slopes, severely eroded	23	VIe-1	45	3c1
J1F	Jefferson-Latham complex, 25 to 40 percent slopes	24	VIIe-1	45	1r1(N) 2r1(S)
LbB	Latham silt loam, 2 to 6 percent slopes	25	IIe-3	43	3c1
LbC	Latham silt loam, 6 to 12 percent slopes	25	IIIe-3	44	3c1
LbD	Latham silt loam, 12 to 20 percent slopes	25	IVe-1	44	3c1
LdD3	Latham silty clay loam, 12 to 20 percent slopes, severely eroded	26	VIe-1	45	4c1
LhD	Latham-Lily complex, 6 to 20 percent slopes	26	IVe-1	44	3c1
L1B	Lily loam, 2 to 6 percent slopes	26	IIe-5	43	2o1
L1C	Lily loam, 6 to 12 percent slopes	26	IIIe-5	44	2o1
LsD	Lily fine sandy loam, 12 to 20 percent slopes	26	IVe-1	44	2o1
LtE	Lily and Steinsburg fine sandy loams, 20 to 30 percent slopes	27	VIe-2	45	3r1
Lv	Lindside silt loam	27	I-3	42	1w1
Mo	Morehead silt loam	28	IIe-4	43	2w1
Mv	Morehead silt loam, high base variant	29	IIw-2	43	2w1
Nd	Newark silt loam	29	IIw-1	43	1w1
Ng	Newark gravelly silt loam, gravelly variant	30	IIw-1	43	1w1
No	Nolin silt loam	30	I-1	42	1o1
Po	Pope fine sandy loam	31	I-2	42	1o1
RgF	Rigley stony fine sandy loam, 30 to 60 percent slopes	32	VIIs-1	45	2x1(N) 3x1(S)
SbC	Shelocta gravelly silt loam, 6 to 12 percent slopes	33	IIIe-1	44	1o2
SbD	Shelocta gravelly silt loam, 12 to 20 percent slopes	33	IVe-1	44	1o2
SbE	Shelocta gravelly silt loam, 20 to 30 percent slopes	33	VIe-2	45	1r1(N) 2r1(S)

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group
			Symbol	Page	Number
ScF	Shelocta stony silt loam, 30 to 50 percent slopes	33	VIIs-1	45	1r1(N) 2r1(S)
SdD	Shelocta-Latham silt loams, 12 to 20 percent slopes	33	IVe-1	44	1o2
SdE	Shelocta-Latham silt loams, 20 to 30 percent slopes	34	VIe-2	45	1r1(N) 2r1(S)
SdF	Shelocta-Latham silt loams, 30 to 50 percent slopes	34	VIIe-1	45	1r1(N) 2r1(S)
SgE	Shelocta-Rigley complex, 20 to 30 percent slopes	34	VIe-2	45	1r1(N) 2r1(S)
SgF	Shelocta-Rigley complex, 30 to 50 percent slopes	34	VIIe-1	45	1r1(N) 2r1(S)
Sh	Steff silt loam	35	I-3	42	1w1
SkC	Steinsburg sandy loam, 6 to 12 percent slopes	36	IIIe-5	44	3o1
SlD	Steinsburg rocky sandy loam, 12 to 20 percent slopes	36	VIs-1	45	3o1
SlF	Steinsburg rocky sandy loam, 20 to 50 percent slopes	36	VIIs-1	45	3r1
Sn	Stendal silt loam	37	IIw-1	43	1w1
So	Stendal silt loam, terrace	37	IIw-1	43	1w1
Ss	Stendal fine sandy loam, sandy variant	37	IIw-1	43	1w1
St	Strip mines	38	------	--	------
TlB	Tilsit silt loam, 2 to 6 percent slopes	38	IIe-4	43	3w1
TlC	Tilsit silt loam, 6 to 12 percent slopes	38	IIIe-4	44	3w1
WcF	Weikert channery silt loam, 40 to 80 percent slopes	39	VIIs-1	45	4d2(N) 5d1(S)
WhB	Whitley silt loam, 2 to 6 percent slopes	40	IIe-1	42	2o1
WhC	Whitley silt loam, 6 to 12 percent slopes	40	IIIe-1	44	2o1
WhD	Whitley silt loam, 12 to 20 percent slopes	40	IVe-1	44	2o1
WtA	Whitley silt loam, terrace, 0 to 2 percent slopes	40	I-4	42	2o1
WtB	Whitley silt loam, terrace, 2 to 6 percent slopes	40	IIe-1	42	2o1
WtC	Whitley silt loam, terrace, 6 to 12 percent slopes	40	IIIe-1	44	2o1

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